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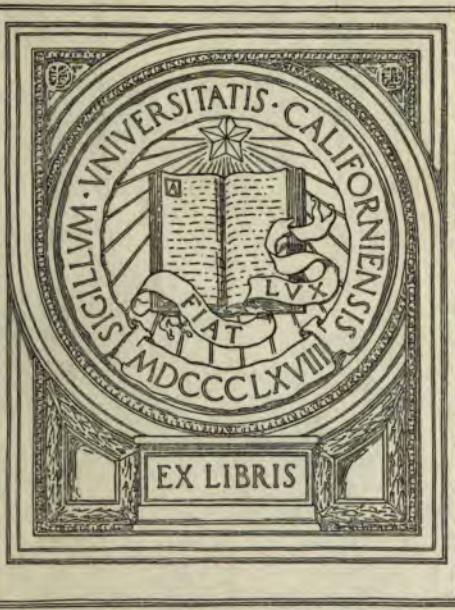

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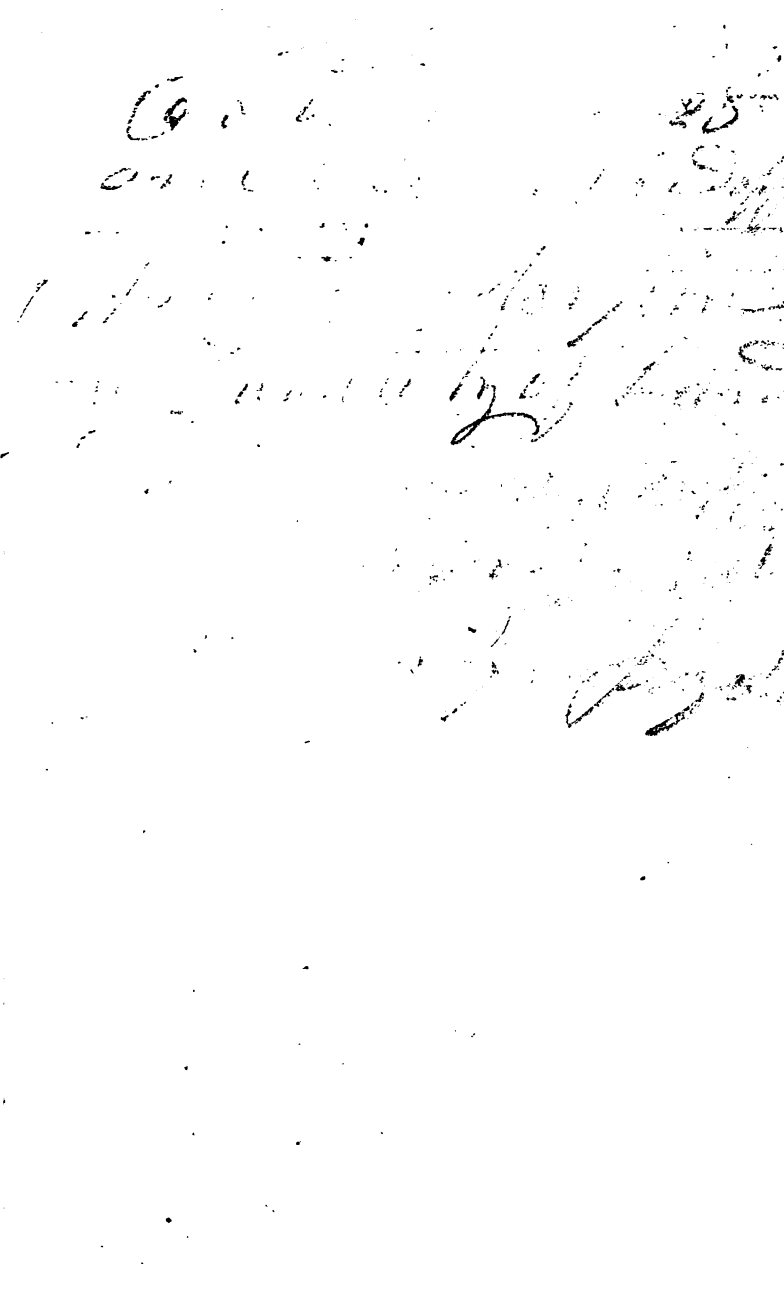

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CHAPTER IV.

HAVING thus detailed the principal breeds or varieties of the British Ox, we may now proceed to some observations relative to the management or treatment of horned cattle; a subject of great importance, inasmuch as their health, the quantity and quality of milk yielded, and their quick ripening for the butcher, are involved in it. The simplest and perhaps the most economical mode of feeding cattle, is by grazing them in fields or on commons, or uncultivated pastures; additional food and shelter being supplied during the winter. But there must be a fitness of the cattle for the land. It ought to be borne in mind, that a cow of large size, and high breed, would starve, or become a miserable object, on poor, or peaty land, where one of the small native kind, hardy and active, would manage to keep herself in tolerable condition. Hence, the cottager, or small dairy-farmer, in rude uncultivated districts, will do wrong to exchange his hardy cows for others accustomed to a rich pasturage: he would find the hope of deriving from them the quantity of milk they yielded in their own grounds, delusive; for though his range of pasturage might be very extensive, yet it would afford such cattle nothing like sufficient nutriment; and the very act of rambling about to pick up what they could, would only increase their bad condition. Cottagers often keep two or three cows, which they usually turn out to feed on the grass, in lanes and by-roads, attended during the day by a boy, and driven home at night. They eke out the sustenance of these animals by cutting and carrying the grass of banks, or by collecting the grass of garden-lawns, mowed by the gardener; and by purchasing, for a trifle, the grains of persons who brew their own malt liquor. Occasionally, within a few miles of London, we have seen such cows in tolerable condition; but in general their quantum of diet is irregular; and their angular points, and tight-bound

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hide, destitute of a due layer of subcutaneous cellular tissue, bespeak an impoverished system. Is it profitable for a cottager—that is, a labourer—to keep cows? A writer in the *Penny Cyclopædia* says: "A cottager, with two or three acres (query, from half an acre to an acre) of moderate land, may keep a cow, and thus add much to his earnings as a labourer. For this purpose, he will require a small portion of permanent grass, fenced off, to allow the cow to take exercise, which is necessary for her health. Her food must be raised in regular succession, and cut for her. The earliest green food is rye, then tares, then clover; which may be made to succeed each other so as to give an ample supply Cabbages, beet-root, parsnips, potatoes, and turnips will continue the supply during winter; and the dung and urine of the cow, carefully collected, will be sufficient to keep the land in condition. This system, lately introduced into some parts of Ireland, has already greatly improved the condition of the industrious poor." In fact, according to this plan, the cottager must pursue a modified system of stall-feeding; and if he can devote a few hours daily to his land, and possesses the requisite knowledge, he will doubtless gain considerably. In the neighbourhood of large towns he will find a ready sale for his milk at the rate of fourpence per quart; he will also have a calf yearly for disposal; and may also keep a few hogs. We think, however, that on this system of green crops and roots, if the land be good, three or four cows may be well kept on three acres, with the addition of a little hay, grains, brewers' wash, &c. A cottager, with the whole of his time, or nearly so, at his own disposal, will, if industrious, thus comfortably maintain himself and his family. "A cow is old and unprofitable when she reaches the age of twelve or fourteen years: she should then be sold, and a young one purchased. If the cottager have the means of rearing a cow-calf to succeed the old mother, he will do well; if not, he must lay by a portion of the cow's produce every year, to raise the difference between the value of a young cow and an old one. The savings-banks are admirable institutions for this purpose; a few shillings laid by when the produce of the cow is greatest, will soon amount to the sum required to exchange an old one for a younger."

The cow, as we have said, should be suited to the pasturage; but on the plan of stall-feeding, or feeding on cut green food in a small inclosure, the cottager may keep a superior

animal, which, properly fed on succulent diet, will yield a considerable quantity of milk, and, when aged, sell for a good price. Generally speaking, a cow may be milked to within a month of her calving, which should occur in April or May. She should then be suffered to become dry; otherwise, when she calves, her new milk will be deficient both in quantity and quality. The calf should have the first milk, which nature has intended to clear the intestines of a glutinous substance, which is always present in the new-born animal.

Besides plenty of succulent green food, the milch cow requires good water, and that which has been for some time exposed to the air is the best; cleanliness is also indispensable; a little rock salt to lick may be occasionally allowed, or a little salt given, as conducive to health At the time of calving, or rather after calving, a little warm water, with some barley or bean-meal mixed with it, will be gladly received; but drenches and medicines should be avoided. Indeed, when a cow is allowed to take proper exercise in the open air, and has a snug shelter or house to resort to in case of stormy weather, heavy rain, or cold, she will generally keep in good health, and recover easily after calving. We suppose the food to be given regularly, and in moderate quantities at a time Occasionally, cows are apt to show symptoms of jaundice, the result of some disturbance in the function of the liver; the eyes and even the skin assume a yellowish tint, and the animal is languid, and ceases to feed with an appetite An aperient draught composed of half-a-pound of Glauber salts, an ounce of ginger, and two ounces of treacle, with two quarts of boiling water poured over them, may be given slowly and gently when milk-warm, and repeated every other day. The cow should be kept from chilly winds, and, if it be winter, have the loins covered with a cloth, and be confined in her shed. This plan will generally prove successful in a short time We would, however, recommend the cottager to get rid of a sickly cow as soon as possible; for should she have some chronic disease, her milk will not only diminish in quantity, but be bad in quality; and she may die suddenly, and thus prove a great loss; whereas, though he may lose by selling her, he will find his first loss the least in the end. A staring coat, a tight skin, loss of appetite, difficulty of breathing, a husky cough, and general leanness, are indications of disease in the lungs, or liver, or both; and the sooner she is parted with the better.

It is a common custom to breed from heifers at too early an age; this is to spoil the cow. The heifer should not be under two years old when taken to the bull; and even then it is as well to let her go dry sooner than older cows; indeed, if she be younger, this is imperative; for the tax upon the immature animal by the calf she has borne, and the drainage of the milk from the system subsequently, tend to arrest her growth and due development. A young heifer, moreover, cannot be expected to produce a fine calf.

The above observations apply more particularly to the poor industrious cottager, who, with small means at command, wishes to keep a cow on the best plan: he has no extent of grazing land; commons generally afford but scanty food, and are for the most part overstocked; besides, he may not have the opportunity of availing himself of a common; and the plan of road-side and by-lane grazing cannot be commended, even on the ground of the habits of idleness entailed upon the boy who spends his day in watching the animal, and driving her from one spot to another, or from ditch to ditch, where the bank holds out a prospect of a tolerable supply. But if the cottager can rent a small piece of ground and has time to cultivate it himself, so as to make it produce greater crops of rye, tares, clover, lucern, cabbages, beet-root, potatoes, and turnips, to be raised in succession and cut for his cow, confined in a cow-house, except while taking exercise in her little paddock, or perhaps, a small orchard, he may certainly make it answer his purpose. If near a large town, he will have a certain sale for all his milk. His own family will need a supply; but from this the cream may be taken, and sold to advantage. He may find it advantageous to make butter; which, as fresh butter sells, ought to bring in a return of ten or twelve pounds per annum, leaving the buttermilk for the use of the family, the rearing of a calf, and the fatten[illegible]g of a hog. After all, however, the affirmative to the question, whether it is profitable for the cottager to keep a cow, will depend on the contingencies of locality; the spare time he has on his hands; the assistance his family can render him; the facilities of disposing the produce to advantage; and the amount of primary outlay he must necessarily encounter; together with the rent of the ground. Where a cottager depends solely on a small piece of land for the support of himself and his family, and for the payment of rent, then indeed his cow is of the utmost importance, if

managed with anything like regularity on a judicious system. It must always be recollected, that cows on poor, though extensive pasturage, give but little milk; that no considerable produce can be expected, be the cow what she may, unless she is supplied with a sufficiency of good succulent food; and that, when a man owns only a small plot of ground, this can only be produced by a well-ordered system of crops in rotation. "If," says a writer, "a labourer, who has an allotment of half an acre of good light land, would entirely devote it to raise food for a cow,—his wife and children cutting the food, and tending the cow in a small yard with a shed, or in any cow-stall, (he would find that he had much greater clear profit than if he had sown his land every year with wheat, and had always a good crop, which last supposition is impossible,)—there would be no better stimulus to industry than to let a piece of land for this purpose to every man who could purchase a cow, and feed it by *soiling*."

We may here add, that the green food should be cut twelve or twenty hours before it is given to the cattle, and not wet with dew or rain; it should be supplied at intervals, and in moderation, as horned cattle are apt to feed voraciously, and the fresh green food is liable to ferment in the paunch, endangering the animal's life from the gases evolved, which distend the abdomen prodigiously. It is but lately that we saw a fine cow which died from this cause: she was left safe in her paddock in the evening, but during the night she contrived to get at some clover, or lucern, in an adjacent inclosure, of which she ate voraciously; in the morning she was found dead, and swollen.

In the neighbourhood of London, where a prodigious supply of milk is demanded, vast numbers of cows, all (or almost all) short-horns, are kept upon the principle of soiling, or stall-feeding, for the sake of their valuable produce. We allude to those large establishments in which four or five hundred cows are kept, and where most of the retail dealers in milk obtain the measure they require. There are, indeed, numerous smaller establishments around London, in which the proprietor, who retails the milk on his own account, keeps from six to twenty, or five-and-twenty cows; and as he has to compete with the retailers who purchase their stock at the great establishments, he seldom resorts to the modes of adulteration, which are commonly practised by the ordinary retailers: not that a little water may not be added; but if this

be all, the purchaser in London may be well contented. It is calculated that upwards of twelve thousand cows are kept to the supply of London and its increasing environs; and as the amount of milk returned by these cattle is mostly retailed by pennyworths or two-pennyworths, morning and evening, we shall readily conclude that the retailers' occupation is one of no little labour. That it is profitable we may conclude from the fact, that "milk-walks" are not unfrequently advertised for sale; but whether the profit be truly fair or just may admit of question. Certain it is that the milk leaves the great dairy in its purity; but what admixtures it may afterwards undergo may require the analysis of the chemist to determine.

Mr. Youatt (whose name we have often mentioned, and to whose memory we pay a tribute of respect for his extensive acquirements and his private worth) says, in his agreeable style, "The name of new milk ha something very pleasant about it, but it is an article which rarely makes its appearance at the breakfast or tea-table of the citizen. That which is got from the cow at night is put by until the morning; the cream is skimmed off, and then, a little water being added, it is sold to the public as the morning's milk. This is the practice of most, or all of the little dairymen who keep their half-dozen cows; and if this were all,—and with these people it is nearly all,—the public must not complain. The milk may be lowered by the warm water, but the lowering system is not carried to any great extent; for there is a pride among them that their milk shall be better than that of the merchants on a yet smaller scale, who purchase the article from the great dairies; and so it generally is. The milk goes from the yard of the great dairy into the possession of the itinerant dealers perfectly pure; what is done with it afterwards, and to what degree it is lowered and sophisticated, is *known only* to these retail merchants."

In all dairy establishments, ventilation and cleanliness are indispensable; and if butter is made, the dairy proper, or butter-room, should be as near the cow-house as possible, as the milk suffers more or less considerably from being agitated, or too much cooled, before it is set for the cream to rise. The milk should be brought from the cows without being exposed to the outer air, before it is set to cream; which should be in vessels arranged on a stone slab, below the level of the ground; the apartment being sunk to the depth of

or four feet, and kept perfectly dry. The air may admitted through perforated zinc plates, or woven-wire dows, placed opposite to each other, having shutters which may be opened or closed according to the temperature and state of the weather Glazed windows may be added, and should be open, excepting in very hot or very cold weather. The situation should be dry, and well shielded from the north, east, and south

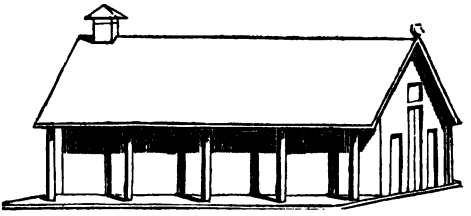
Dairies in natural or artificial caves, which occur in some countries, with springs of water at hand, are admirable for coolness and uniformity of temperature, but in England we must not look for such advantages; nor are they needed A verandah round a dairy is very useful; it shades the sun in summer, and is a protection against the cold and damp in winter There should be a washhouse, with every convenience for hot water, for scalding the dairy utensils, and for warming milk; and if cheese be made as well as butter, a churning-room, with presses, and a cheese-room are also needed.

"In Switzerland and in Holland the cow-house and dairy often have a very neat appearance, within a short distance from the principal residence. The plan in both countries is very similar; the style of the roof is the chief difference. In the common dairy-farms of Holland the farmer and his family live under the same roof with the cows. In the Netherlands, especially in North Holland, or Friesland, a cow-house is as clean as any dwelling-house, and the family often assemble and take their meals in it. The following description of a cow-house and dairy, under one roof, combines all that is useful, with considerable neatness internally and externally:—It is a building about sixty feet long, by thirty wide, with a verandah running round three sides of it. The dwelling is not here attached as it usually is in common (Dutch) dairies, and the building is not surrounded by a farm-yard. These are the only circumstances in which it differs from that of a common peasant's. The dairy-room is sunk below the level of the soil, and is paved with bricks; the sides are covered with Dutch tiles, and the arched roof with hard cement. The cow-house, like all in Holland, has a broad passage in the middle, and the cows stand with their heads towards this passage, which is paved with clinkers, or bricks, set on edge. Their tails are towards the wall, along which runs a broad gutter, sunk six or eight inches below the level of the place

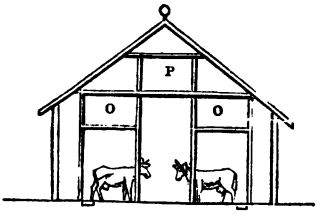
on which the cows stand. This gutter slopes towards a sink covered with an iron grate, which communicates, by a broad arched drain, with a vaulted tank, into which all the liquid flows. The gutter is washed twice a day before the cows are milked. The cows stand or lie on a sloping brick floor, and have but a small quantity of litter allowed them, which is removed every day, and carried to the dung-heap, or the pig-sties, to be more fully converted into manure. In Holland the cows' tails are kept up by a cord tied to the end of them, which passes over a pully with a weight at the other end. as we see (used to see) practised with horses that have been nicked; thus they cannot hit themselves or the person who milks them. (We do not see anything in this practice very commendable.) The manner in which the cows are fastened is worthy of notice:—Two slight pillars of strong wood are placed perpendicularly, about two feet distant from each other, so that the cow can readily pass her head between them; in each of these is an iron ring, that runs freely up and down, and has a hook in its circumference; two small chains pass from these hooks to a leathern strap, which buckles round the neck of the cow. Thus the cow can rise and lie down, and move forward to take her food, which is placed in a low manger between the two pillars; but she cannot strike her neighbour with her horns. The mangers, or troughs, are of wood, or of bricks cemented together, and are kept as clean as all the rest of the cow-house."—The food is brought in carts, which are driven at once between the cows, whose mangers are thus conveniently supplied; what is not wanted is stored above, and when wanted is readily thrown down before the cows. By this plan much trouble is saved, and one man can attend to many animals. From November till May the cows never leave the cow-house. In summer, when they are out, if they are in adjacent pastures, they are driven home to be milked; but if the pastures are far off, which is sometimes the case, they are milked there, and the milk is brought home in boats: but this is not thought so good for the butter, which is then always churned from the *whole* milk, without taking the cream-rise. The finest and best-flavoured butter is always made from the cream as fresh as possible; and to make it rise well the milk should be set as soon as it is drawn, and agitated as little as possible. The greatest quantity is seldom obtained when the quality is the finest. When great attention is paid to the quality, the milk

is skimmed about six hours after it is set, and the cream then taken off is churned by itself. The next skimming makes inferior butter. It is, in fact, essential that the dairy should be as near the cow-house as possible. In Holland the milk is carried in brass vessels, exquisitely clean.

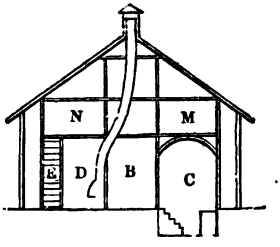
The subjoined plans will convey a clear idea of the Dutch cow house and dairy, above described.



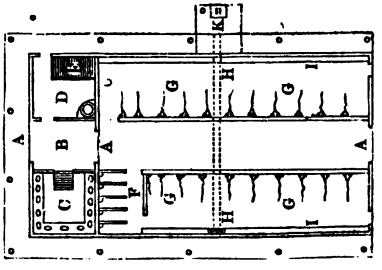
SIDE VIEW.



SECTION OF COW-HOUSE.



SECTION OF DAIRY.



GROUND PLAN.

A A A, passage through the cow-house and dairy, ten feet wide, paved with bricks, set on edge, or Dutch clinkers. The food is brought along this passage in a small cart, and distributed to the cows. B, part of the passage above mentioned, closed in with doors, and forming a vestibule to the dairy. C, the dairy-room, in which only milk, cream, and butter are kept: it is sunk three feet under the level of the cow-house, and covered with a brick arch; it has one latticed window, and several ventilators, on a level with the place on which the milk vessels are set. D, the room where the utensils are scalded, and where cheese is made: in one corner is a fireplace, with a large kettle or a copper set. E, stairs to go up to the cheese-room M, and the loft N F, calf-pens, in which the calves are tied up to fatten, so that they cannot turn to lick themselves; there is a small trough with pounded chalk and salt in each pen. G, the place for the cows, without partitions, each cow being tied to two posts by two small chains and two iron rings, which run on the posts; the chains are fastened to a broad leathern strap, which is buckled round the neck of each cow. H H, two sinks, or drains, with iron gratings over them, to catch the fluid refuse from the gutters I I, which run along each side of the cow-house. K, the tank for the refuse, vaulted over with a door, L, to clean it out, and a pump to pump up the liquid manure. o o in this section are places where the green food or roots are deposited for the day's consumption.

With respect to the fluid manure, of which the Dutch and Flemish are so careful, it is generally wasted by the dairy-farmers of England. Yet, as a manure for gardens, &c., it is very valuable; and in Belgium would return, by contract, an average of £2 per cow by the year; four hundred cows would thus produce £800 per annum in this manure alone,—good interest for the outlay of constructing the vaulted tanks for its reception.

Such is the general outline of the plan of stall-feeding milch cows. The system may be carried on by the cottager with a small plot of ground and one cow; and it is so, more or less thoroughly, by the large dairymen, who supply London and other populous towns and cities with milk, as well as by the farmers of Holland and Belgium, where farms are small, where great attention is paid to agriculture, and where manure is extremely valuable. In England, however, within the last few years, comparatively speaking, the system

of stall-feeding has been adapted to the process of fattening cattle, which goes on without interruption throughout the winter as well as the summer; so that fat beasts,—even the most highly fatted,—grace the markets at Christmas, and attract a crowd around the butcher's decorated shop Generally speaking, the practice of stalling milch cattle is little practised in our island, or only partially, and at certain seasons of the year; but the practice of stall-feeding oxen for the butcher is extensively carried on, and the stall-fed ox is now an expression familiar to our ears, and well understood; whereas, in former times, vaunted as "the roast beef of England" may be, all the beasts killed in the dead winter months were miserably thin, and salt beef was the ordinary fare, even of the most opulent, from November to May.

When cattle feed in inclosed rich pastures, though they may thrive well, yet there is a thorough waste of their manure, and more grass land must be preserved untouched by the plough than otherwise need be. An advocate for stalling says, "Their dung falling in heaps on the grass, does more harm than good. The urine, indeed, fertilizes the soil in wet weather, when it is diluted; but in dry weather, it only burns up the grass. If we calculate what would be the amount of manure collected, if the cattle were kept in yards or stables, and fed with food cut for them, and brought there, and also the loss of grass by treading in the pastures, we shall have no doubt, whether the additional labour of cutting the grass and bringing it home daily, is not amply repaid by the saving. But if we also take into the account the variety of artificial grasses, pulse, and roots, which may be grown with advantage on land unfit for permanent grass, and the quantity of arable land which may thus be kept in the highest state of cultivation, we shall be convinced that the practice of those countries where the cattle are kept constantly at home is well worthy imitation. It may be of use to the health of the animals to be allowed to take a few hours' air and exercise, in a pasture near the stable, but there is no advantage in having any grass-crop there; on the contrary, the barer of grass the crop is the better. They will relish their food better when they are taken in, after a few hours' fasting. A bite of fresh short grass might, on the contrary, give them a dislike to their staler food. When cut grass is given to the cattle in their stalls, it is best to let it lie in a heap for twelve hours at least, before it is given to them. It heats

slightly, and the peculiar odour of some plants which oxen and cows are not fond of, being mixed with that of the more fragrant, the whole is eaten without waste. Experience has shown that many plants which cattle refuse in the field, where they have a choice, possess nutritious qualities when eaten mixed with others in the form of hay. There are few deleterious plants in good grass land or water meadows, and these are readily distinguished and weeded out. The quantity and the quality of the dung of cattle stalled and well fed is so remarkable, that its value makes a considerable deduction from that of the food given, especially of green food, such as clover, lucern, tares, and every kind of leguminous plant:—we shall not be far wrong if we set it at one-fourth. This supposes a sufficient quantity of straw for litter, and a collection of the liquid parts, in proper reservoirs or tanks. In order to make the feeding of cattle advantageous, the buildings must be conveniently placed with respect to the fields from which the food can be brought. Moveable sheds with temporary yards, which can be erected in different parts of a large farm, according as different fields are in grass or roots, are a great saving of carriage, both in bringing food to the cattle and carrying the dung on the land. A clay bottom should be selected, in a dry and rather high spot if possible. But if permanent buildings for cattle, constructed of rough materials and thatched with straw, were erected in the centre of about forty acres of arable land, in different parts of a large farm, it would probably be a great saving in the end." A due supply of water, and of rock-salt to lick, are very essential, and a free use of the currycomb or rough straw whisp is advantageous, both in point of cleanliness and health.

CHAPTER V

WITH reference to the roots and plants cultivated for the use of cattle, the turnip claims our first notice. Under this head we include the Swedish kind, or Ruta Baga.

"It may be considered," says an authority on this subject, "that the most advantageous mode of consuming turnips is to draw them and cut them in slices in the field, there to be consumed in troughs by sheep, to whom corn or oil-cake, as well as hay, is regularly given.

"When the crop of turnips is abundant, part of them may be stored for the cattle in the yard or fatting stalls, and for the milch cows and heifers. They will require nothing but good straw if they have plenty of turnips, and no hay need be used, unless it be for the horses; and even they will thrive well on Swedish turnips and straw, with a small quantity of oats. Turnips are often left in the field all winter, which greatly deteriorates them If they cannot be fed off before Christmas, they should be taken up with the tops on, and set close together, covered with the tops, on a piece of grass, in some dry spot. They will thus be quite sufficiently pro tected from the frost; or the tops may be cut off, within an inch of the crown of the root, and the turnips be then stored in long clamps, five feet wide and four feet high, sloped like the roof a house, and covered with straw and earth, in which state they will keep till they are wanted. It is advantageous to have different varieties of turnips, which will come to perfection in succession; and it is useful to sow some at different times for this purpose."

Among other vegetables useful as food for cattle, the beet tribe claim notice. The root of the field beet, mangold-wurzel, or mangel-worzel (Beta altissima), which was long known in Germany, was introduced at the close of the last century, it is said, by Dr. Lettsom, a physician of great

eminence, and is now very extensively cultivated. The common red beet (Beta vulgaris) is cultivated in gardens for the sake of its delicate root; but there is another species, the chard beet (Beta cycla), inferior in the size of its root, but remarkable for the thickness and size of its leaves, which are yellow, white, green, or crimson, in different varieties. On the Continent these leaves are used in soups, and the ribs are stewed; in England the leaves are sometimes substituted for spinach, but they are held in little estimation; yet cattle are extremely fond of them, and the plant, which is very luxuriant, might be cultivated with advantage, as field produce, in rows; the more so, as it is an excellent substitute for fallow on light good loams.

If sown in May in drills two feet wide, and thinned out to the distance of a foot from plant to plant, in rows, they will produce an abundance of leaves, which may be gathered in August and September; these, a central bunch being left on each plant, are rapidly renewed, affording a succession of food. These plants do not sensibly exhaust the soil, and, what is more, the leaves add much to the milk of cows, without imparting to it that disagreeable flavour which it is apt to acquire when the cattle are fed upon cabbages or turnips, and which is owing in some measure to the rapidity with which these latter run into the putrefactive fermentation. The leaves of the chard beet when steamed with bran, chaff, or refuse grain, form a very good food for pigs, and also for bullocks put up to fatten.

With respect to field-beet or mangold-wurzel, its root is too well known to need any description, nor need we comment on its culture, which is most successfully carried on in deep sandy loams made rich by repeated manuring. The sowing time is May, and the roots should be taken up and stored for winter use towards the close of autumn; the top, as well as the tap root, being removed, and the earth scraped carefully away. They may be packed in the barn or root-house, in layers alternating with layers of straw; the whole mass being then well covered and defended from the frost. Or they may be put into trenches, having a good layer of straw at the bottom and on the sides, till they rise in a ridged pile three feet above the level of the ground, the whole being then covered with straw, and a thick outlayer of the earth dug out of the trench; around the mound a drainage gutter with free outlets must be dug, in order that no water may soak into

the mound. When the roots are required for use, the mound must be opened at one end, and after the requisite quantity is extracted, the opening carefully covered up as before. In either of these two modes they may be kept till spring.

There are few crops more valuable as winter food for cattle than the beet or mangold-wurzel. Swedish turnips (or Ruta baga) exceed them in the quantity of nourishment, weight for weight; but on light and well-manured soils the produce of the beet per acre is much greater. According to Einhof and Thaer, eighteen tons of mangold-wurzel are equal to fifteen tons of ruta baga, or seven and a half tons of potatoes, or three and a half tons of good meadow hay, each quantity containing the same nourishment; but the roots may be grown upon less than an acre, whereas it will take two or three acres of good meadow land to produce the equivalent quantity of hay. Of all these root-crops, it appears that the least exhausting to the land is that of the beet. The mangold-wurzel is admirable for bullocks, given with dry food, but cows fed too largely on it are said to become too fat and to lose their milk; under some circumstances, however, this very circumstance would prove an advantage, especially when it is desirable to dry and fatten off cows, and prepare them as soon as possible for the butcher. A white variety of the beet is cultivated in France for the extraction of sugar from its juice

The carrot (Daucus carota), of which there are many varieties, affords a valuable root for the food of cattle. In England the large orange carrots are most frequently raised in the fields for winter consumption, but on the continent large white and yellow sorts are more esteemed. In Belgium it is common to sow the white carrots in spring amongst barley which is reaped early; as soon as the barley is cut, the land is cleared of weeds and stubble, and liquid manure is poured over its surface. The carrots which were scarcely visible, and the tops of which were cut off in reaping, now shoot up, and where they require are thinned by hoeing. At the end of autumn the crop is carefully forked up, and the ground prepared for some other crop. Where hay is scarce, carrots form a very economical substitute: they must be kept in dry root-houses or in trenches. From twenty to forty pounds of carrots, with a small quantity of oats, is sufficient allowance for a working horse for twenty-four hours: these

roots, however, when cut and steamed, are rendered more nutritious. Parsnips are also treated in the same way, and also potatoes.

From these roots we may turn to the artificial grasses (as they are commonly, but erroneously called), of which several are of the highest importance to the cattle-keeper. Among these lucern (Medicago sativa) is pre-eminent. This plant—one of the leguminous family—was in high repute in ancient times, and is spoken of with great commendation by the writers on agricultural topics; nor has it lost its celebrity in the present day, and wherever husbandry has made progress it is largely cultivated, granting the soil and the climate to be suitable. Where these are favourable lucern grows with astonishing rapidity and luxuriance; but as it will not bear extreme frost, nor flourish on a poor, cold, wet soil, nor yet on sterile, stony ground, the farmer must exercise discretion. Deep rich loam, which has been previously trenched and well manured, is rather light, and thoroughly drained, is the best; and the produce of every such acre will be astonishing. Its growth is singularly rapid—that of clover is not to be compared to it: a tuft of lucern will rise to a foot above the surface, after being mown, in the time that clover will rise only a few inches. It lasts from eight to twelve years, striking its roots deep into the soil, where they are out of the reach of drought; and in the most parched and sultry weather, when the herbage around languishes or withers for want of moisture, the lucern rises fresh, green, and vigorous. Its great bane is a wet subsoil; this must be dry and rich, and the surface must be clear of weeds. Land on which two successive crops of turnips have been raised, and which have been fed off with sheep, when well prepared, gives a good return of lucern. In the Month of March the sowing should take place. A small quantity of barley, perhaps a bushel to the acre, should be drilled into the ground, and at the same time from thirty to forty pounds of the lucern seed sown broad cast; the ground must be now harrowed and lightly rolled, so as to lay it flat and even, without water furrows.

When the crop appears it must be well weeded, otherwise there is a great probability that it will fail. When the barley is reaped, the stubble should be eradicated either by the hoe or the harrow; at least this is a good practice, especially if the plants of lucern be strong. In a short time it may be cut as fodder, but sheep should not be depastured on it, as they

bite too close to the root. It should always be cut as soon as the flower is formed, and also cleared of weeds.

The second year will generally bring in an early crop, and it may be cut four or five times during the season; the ground being each time weeded, or cleared, by means of a sort of harrow.

The cottager, with a small plot of ground, will do well to sow lucern in rows, and cut at regular intervals a portion for his cow, using the hoe for the purpose of keeping the ground clear from weeds.

Of all green fodder, both for horned cattle and horses, lucern is perhaps the best. Horses fed upon it, with the addition of a little corn, will keep up their strength and condition under hard labour. Cows thrive upon it, and return a full supply of milk; but lucern must not be given to the cows or oxen in too large quantities at a time,—it must not be given when wet with rain or dew: and the best plan is to keep it for twenty-four hours after it is cut, in order that the juices may be evaporated to some extent under a partial fermentation, a process which, while it adds to the nutritive qualities of the herb, renders it less liable to inflate the stomach of the cattle, or, as the farmer would say, produce "hoove," that is, distention of the stomach from gas.

Lucern is not easily made into hay; it is too succulent to dry rapidly, and a shower of rain, in its half dry state, is almost sure to spoil it, as the stem is quickly soaked with moisture, which does not readily evaporate; yet, in favourable seasons, a heavy crop of good hay may be obtained, the produce of an acre being nearly double that of clover.

Sainfoin (Hedysarum onobrichis) is another leguminous plant of great value; unlike lucern, however, it prefers a calcareous or chalky soil to a deep, rich loam, and flourishes where the latter would perish. Its root is strong and fibrous, and strikes deep into the stony soil, finding moisture even in the dryest seasons; but a wet, cold, heavy subsoil is very detrimental to the health of this plant, and causes the roots to perish; and, as in the case of the lucern, it decays when choked up by dank weeds or grass. A crop of sainfoin on a fit soil, and properly managed with occasional top-dressings of ashes and manure, will last for eight or nine years, giving yearly several cuttings of green fodder or two of hay. Sainfoin is usually sown in the spring, in a thin crop of barley or oats, the same general plan being pursued with respect to its

cultivation as with lucern; and the farmer must not expect to see it in full luxuriance till the second year.

Sainfoin hay should be made, if possible, in dry, hot weather, so that all the juices of the plant may be evaporated before the stack be made. This is important, for if any moisture be left the whole is apt to become mouldy; indeed it is recommended that in precarious weather it be carried green (if not wet with showers or dew) under cover, and stacked in alternate layers with good dry straw. By this means it will impart some of its fragrance to the straw, and lose none of its nutritive qualities. The same observation applies both to lucern and clover. Sainfoin hay is extremely relished by cattle, and if well made is very nutritious; nor is it less acceptable in its green state, and this, perhaps, is the most advantageous way in which it can be used.

Clover (Trifolium) is another important plant, of which several species are cultivated, some being perennial, as the Dutch clover (Trifolium repens), the cow grass clover (Trifolium medium), the lesser yellow trefoil (Trifolium minus); some biennial, as the common red or brown clover (Trifolium pratense), and some annual, as the French clover (Trifolium incarnatum).

It is the red or brown clover which is generally cultivated, both as green fodder and as hay for cattle; this is usually sown with barley or oats, but sometimes among wheat or rye, in the spring. In Norfolk it is the practice to sow it with barley; in Scotland it is often sown with wheat; and in Belgium with rye. But this depends on the system of rotations adopted in different countries.

The first crop of clover is generally mown and made into hay. During this process care must be taken lest the tender leaves of the plant be broken off in drying; consequently, the swarth should not be tossed up and shaken about, as is done with common meadow hay, but merely turned over and exposed to the sun and air; and then, when all moisture is evaporated, carefully stacked up. Should the clover unfortunately become soaked with rain, nay, even if the rain should continue, the farmer must wait until fine dry weather returns, and completes the process of drying; if this is not effected the hay will certainly become musty. But however spoiled in appearance, if it be at last fairly stacked in a dry state, with salt scattered in, it will be acceptable to the cattle in winter, and even nutritious. A writer says, that "A very good method in

those seasons when a continuance of dry weather cannot be reckoned upon, particularly when the second crop is cut in September, is to take advantage of two or three dry days to cut the clover, and turn it as soon as the dew is completely dried off the upper side; the next day do the same, and, in the evening, carry the green dry clover, and lay it in alternate layers, with sweet straw, so as to form a moderately sized stack. A fermentation will soon arise, but the dry straw will prevent all danger from too much heating, and, acquiring the flavour of the clover, will be eaten with avidity by the cattle. To those who make clover hay for the use of their own stock in winter, we recommend this as far preferable to the common method, even when there is less danger from the weather. In northern climates it would probably save the crops two years out of three."

Many farmers are in the habit of sowing rye-grass (Lolium perenne) in a small proportion with clover, especially on lands which have been repeatedly cropped with the latter, and therefore somewhat exhausted. The plan is very excellent, for when the mixed crop is cut and made into hay, the young rye-grass will prove a good corrective to the heating qualities of the clover. It is true that pure clover hay is preferred in and about London, where it is extensively used cut into chaff, and mixed with oats, beans, &c., and given to hard-working horses. With respect to horned cattle, green clover with tares and other artificial grasses is largely given; and if the succession of crops is well managed, a supply of green fodder may be obtained from May to the end of November.

The French clover (Trifolium incarnatum) has been introduced from the south of France only within the last few years. This plant is a valuable addition to our list of artificial grasses, and when sown in the spring it rapidly arrives at perfection One of its principal uses is as early food for ewes and lambs; for this purpose it is sown in autumn, after harvest, the stubble land being harrowed so as to raise the mould. On this the clover-seed is sown at the rate of 18 or 20 lbs. an acre, then rolled in well. It springs up and stands the winter well; and on the return of spring appears in luxuriance. It makes excellent hay, and may be cleared off the ground in good time to plough the land and clean it for turnips. It may be mixed with rye-grass, but from its rapid and vigorous growth is not well adapted for sowing with a crop of corn; indeed it is doubtful whether this should be done with any clover.

Tares or vetches (Vicia sativa), of which there are several varieties, constitute a very important green crop, thriving best on heavy soils, and yielding a profitable return. One sort is much more hardy than the other, and will stand the severest winter; this may be sown in the autumn for early spring fodder, the more tender sort in March, and it will come in three or four weeks after the former. A good farmer will aim at a succession of green crops, and tares may be sown from spring till August, for winter use. If the farmer has more tares than he absolutely needs, he may make them into excellent hay, should the weather permit; or depasture sheep upon them, cutting the fodder and securing it in proper racks, that it may not be trodden under foot and wasted. A succession of tares and brown clover may be kept up from May to November. Tares require the land to be well manured; but they become an excellent substitute for a summer fallow on heavy soils, and thus amply repay the outlay in labour and manure expended upon them.

Such are the roots and artificial grasses on which cattle are fed; we here say nothing of the ordinary grasses of the meadow, nor of common hay, straw, chaff, or grains, for with these all are familiar. In supplying cattle with artificial fresh-cut grasses, lucern, sainfoin, clover, &c., care must be taken,—and we repeat our injunction,—that they be cut in as dry a state as possible, and left for twenty-four hours to undergo partial fermentation before being given to the cattle; and even then they should be allowed only in moderate quantities at a time, otherwise the animals are apt to become hooven or hoven, owing to the evolution of carburetted hydrogen in the paunch; indeed, we have known cows, which had been previously feeding on a rather scanty grass pasturage, thus affected after being turned upon a rich aftermath. Of all the artificial grasses, none is more apt to render cattle hoven than lucern rashly given; they are apt to gorge themselves; whereas, if a small portion only be allowed from time to time, they masticate it more thoroughly, rendering it much more readily digestible, and consequently better adapted for yielding to the assimilating organs the principles of nutrition. The cow will thus retain her health, and yield more and richer milk. Many practical farmers consider lucern, at all times, too stimulating for milch cows; they aver that, if largely used, it deteriorates the milk, and is apt to produce eruptions about the thighs and abdomen, from which exudes an acrid humour, producing

foul incrustations, loss of hair, and irritation of the skin, together with great debility, and loss of appetite and milk. This disease, termed by the French *rafle*, or *jet de la lucerne*, may be removed by a change of diet, cleanliness, and exercise; the water should be soft and pure, with a little flour mixed with it; and the food, if green, sprinkled with a little salt.

Some have objected to mangold-wurzel for milch cattle, but we doubt whether on sufficient grounds; for it is often the sudden change from one diet to another, without variation, and not the article of diet itself, that is injurious. When mangold-wurzel is given with a proper proportion of hay, it has been proved by experiment to be very salutary; but if the statement in the *Farmer's Journal* for 1814 is to be relied upon, it has, when given alone, produced a partial paralysis and a loss of milk; but in the instances narrated it appears that the cows were suddenly transferred to this diet without any admixture. Half a bushel of *sliced* mangold-wurzel, morning and evening, with a good allowance of sweet hay in the intermediate portion of the day, has been tried, and found to keep cows not only in health, but in the finest milking condition. That there is nothing deleterious in this root appears from its analysis:—a thousand parts contain about 50 of sugar, 22 of mucilage, 2 of starch, 6 of extract, 35 of woody fibre or lignin, and 885 of water. Next to mangold-wurzel, many farmers regard parsnips as the most valuable root; indeed, in some districts, and particularly in Jersey, this root is largely used, both for milch cows and for fattening oxen. They are best when steamed, as are also potatoes; indeed, cut straw or chaff (*not the husk of grain*, which is most dangerous, and scarcely if at all digestible) forms a much more nutritious food when steamed and given warm than in its crude condition. On steamed roots, steamed chaff, and a little hay, many large farmers keep not only milch cows, but oxen and working horses, at least during the winter. We are talking of stall-fed cattle, and not of such as are depastured in the fields, though, where the fields are eaten bare, a regular allowance of food on the same principles is necessary. A discreet allowance of green fodder, cut grass, mangold-wurzel sliced, turnips sliced, steamed roots and hay, or cut straw and brewer's grains, clover, chaff, and oil-cake, or linseed boiled or unboiled, form the staple articles of the diet of cattle; and the proportion in which any of these is to be given, depends on the condition of the animals, and whether they are milch

cattle or cattle for fattening. When oats are given they should be always bruised, as they are very difficult of digestion, and often produce serious mischief, remaining unchanged in the alimentary canal

Previously to stall-feeding cattle, it is advisable to keep them for a short time on a bare pasture. By this plan the stomach acquires tone and vigour, the appetite is healthily increased, and the animals feed with a greater relish, and fatten more rapidly. During their feeding the healthy tone of the stomach should be maintained, and the diet in proportion to the ease of good digestion, which should always "wait on appetite."

In the treatment of cattle, whether in the field or in the stall, good clean water is essential. Where no good water is otherwise accessible, it is better to sink wells, and pump the water into stone troughs, than to allow the animals to drink from a muddy, filthy pond, full of putrescent animal and vegetable matters, which generate many diseases. Such water injures the quality of the milk, and disorders the digestive organs. These evil effects are often attributed to the grass, whereas the cause is in the water and not in the pasturage. It is notorious that cows pastured in districts where marshes and stagnant pools abound, into which the drainage of the land is carried, are subject to that scourge of cattle known as "Red Water," and also to severe diarrhœa.

Cattle in their pastures drink at will, and usually take from 12 to 18 or 20 gallons in the course of twenty-four hours; but when stall-fed, it is necessary to supply them twice or three times a day, according to the nature of their food. If fed on dry provender, they require water more frequently than when eating succulent herbage or juicy roots; and neglect in this point is one of the causes of various inflammatory diseases, which often make their appearance to the loss of the feeder. With a due supply of pure water, cleanliness, the free application of the currycomb, ventilation, and a little gentle exercise daily in a bare inclosure, are very important concomitants. A hot, close, undrained cow-house, into which pigs, fowls, ducks, &c., have free access, is a disgraceful spectacle.

The management of milch cows, and of the dairy, is a simple affair. It is on good old natural pastures that they maintain the best health, return the most milk, and select the herbage best suited to their appetite; but when housed or

stalled, the great rule is not to overtax their digestive powers, while a sufficiency of food is supplied, and that wholesome and of more than one sort. If overfed, the cow will have some difficulty in bringing forth her calf; her udder will sympathize with the derangement of the stomach, and the vital functions will be all in disorder. Good sense and a little experience must be brought into operation. The same remarks apply to cattle fattened in the stall for the butcher.

Grass land may be divided into water-meadows, upland pas tures, and artificial grasses.

Of all the substances which concur in the vegetation and growth of plants, water is the most essential: without mois ture the seed cannot germinate, nor can the plant receive nourishment. This circumstance has suggested the plan of diverting streams, and conducting them in channels, to fertilize as great an extent of land as possible. It seems that where there is great heat in the air, water alone will supply the necessary food for the growth of plants. It is probable that the component parts of the atmosphere are more easily separated, and made to enter into new combinations with those of water, in a high temperature than in a lower; or that the leaves and green parts of vegetables imbibe water in a state of solution in air, and that in this state it is more easily decomposed. Atmospheric air and water contain all the principal elements of vegetables, viz., oxygen, hydrogen, carbon, and nitrogen; the remainder are either found in the soil, or diffused through the water. Manures seem to act principally as stimulants or re-agents, and are themselves composed of the same elements: they are of no use unless diffused or dissolved in water; but when the water is impregnated with animal or vegetable substances, the effect is far greater and more rapid than when the water is pure.

Water has also an important office to perform, if we admit the principle discovered by Macaire, that plants reject through their roots those portions of the sap which are the residue of its elaboration, and which are of no further use to the plant, but rather injurious if they are again imbibed by the roots Plants seem to require a removal of their excrements, as animals do when tied up in stalls, or confined in a small space. If this is not effected, they suffer and contract diseases. The percolation of water through the soil is the means which nature has provided for this purpose. Hence we can readily

suppose that the mere washing of the roots has a beneficial effect, and to this in a great measure must be ascribed the fertilizing effects of pure and soft running water.

If water stagnates and is evaporated, and the noxious matter held in solution remains in the soil, all the advantage of irrigation is lost, and the better kinds of grasses are succeeded by rushes and coarse aquatic plants. The circulation of the water, therefore, appears to be as necessary as its presence; and, provided there be a sufficient supply of water of a proper quality, the more porous the soil, and especially the subsoil, is, the more vigorous is the vegetation. It is on this principle alone that we can rationally account for the great advantage of irrigation in those climates where rain is abundant, and where the soil, which is most benefited by having a supply of water running through it, is of a nature to require artificial draining as an indispensable preliminary to being made fertile by irrigation. By keeping these principles in view, great light will be thrown on the practical part of irrigation, which, having been long established by experience, before these principles were thought of, depends not on their correctness, but only confirms their truth.

The whole art of irrigation may be deduced from two simple rules, which are, first, to give a sufficient supply of water during all the time the plants are growing; and secondly never to allow it to accumulate so long as to stagnate.

The supply of water must come from natural lakes and rivers, or from artificial wells and ponds, in which it is collected in sufficient quantity to disperse it over a certain surface. As the water must flow over the land, or in channels through it, the supply must be above the level of the land to be irrigated. This is generally the principal object to be considered. If no water can be conducted to a reservoir above the level of the land, it cannot be irrigated. But there must also be a ready exit for the water, and therefore the land must not be so low as the natural level of the common receptacle of the waters, whether it be a lake or the sea, to which they run. The taking of the level is therefore the first step towards an attempt to irrigate any lands.

Along the banks of running streams nature points out the declivity. A channel, which receives the water at a point higher than that to which the river flows, may be dug with a much smaller declivity than that of the bed of the river, and made to carry the water much higher than the natural banks.

It may thence be distributed so as to descend slowly, and water a considerable extent of ground in its way to rejoin the stream. This is by far the most common mode of irrigation; and the shape, size, and direction of the channels are regulated by the nature of the surface and other circumstances, which vary in almost every situation.

We shall suppose a river to run with a rapid current between high banks. At some point of its course a portion of the water is diverted into a canal dug along the bank, with a very small declivity. The water in this canal will flow with less rapidity than the river, but will keep the same level as that part of the river where it has its origin. Thus the water may be carried over lands which are situated considerably above the bed of the river farther down. All the lands between this canal and the river may be irrigated if there is a sufficient supply of water. The canal may be carried to a considerable distance from the river. The size of the canal and its declivity depend on the quantity of water which may be made to flow into it. A dam is often constructed across a river, in order that as much of its water as is possible may be diverted, and the original channel is often laid quite dry, to take advantage of all the water at the time when it is advantageous to irrigate the land. To have an entire command of the water, there are flood-gates on the main channel and on the lesser branches, by opening or shutting which the water may be stopped or made to flow as may be required. It must be remembered, that to carry water to a considerable distance, and in great quantity, a larger channel and more rapid declivity are required; and it is a matter of calculation whether it is most advantageous to bring a smaller quantity to a higher point, or a greater abundance somewhat lower. Having a certain command of water, it may be carried from the main channel by smaller branches to different points, so as to irrigate the whole equally. These branches should be nearly horizontal, that the water may overflow the sides of them, and be equally distributed over the land immediately below. Every branch which brings water over the land should have a corresponding channel below to carry it off; for the water must never be allowed to stop and stagnate. When it has run fifteen or twenty feet, according to the declivity, over the land situated below the *feeder*, or the channel which brings the water, it should be collected into a drain, to be carried off, unless it can be used to irrigate lands which lie still lower.

Finally, it runs back into the river from which it was taken, at a lower point of its course.

When there is a considerable fall and a sufficient supply of water, a series of channels may be made, so situated below each other, that the second collects the water which the first has supplied, and in its turn becomes a feeder to irrigate the lower parts of the declivity; a third channel receives the water and distributes it lower down, until the last pours it into the river. This is called *catch-work*, because the water is caught from one channel to another. This method is only applicable where there is a considerable fall of water, and a gentle declivity towards the river. But it must be borne in mind that the water is deteriorated for the purpose of irrigation when it has passed over the land, and that it is not advantageous to let it flow over a great extent when a fresh supply can be obtained: but where only a small portion of water can be commanded, that must be made the most of; and it will irrigate three or four portions of land in succession without there being any very marked difference in the effect: beyond this it rapidly loses its fertilizing qualities.

In many situations the great difficulty in irrigation arises from the want of a supply of water; but even then a partial irrigation may be effected, which will have its advantages. A small rill which is often quite dry in summer may, by judicious management, be made to improve a considerable portion of land: its waters may be collected in a pond, or reservoir, and let out occasionally, so that none be lost or run to waste. If there is only a small quantity, it must be husbanded and made to flow over as great a surface as possible. If there is water only at particular seasons of the year, and at a time when it would not be of much use to the land, it may be kept in ponds, and it will lose none of its qualities by being exposed to the air. If animal or vegetable matter in a partial state of decomposition is added to this water, it will much improve its quality.

If there is not a want of water, there may be a want of declivity to enable it to flow off, which is an essential part of irrigation. Art may in this case assist nature by forming a passage for the water, either in its course towards the land to be irrigated, or from it after it has effected its purpose. Where there is no natural exit, and it might cause too great an expense to make an artificial one, the water may sometimes be led into shallow ponds, where a great part is evaporated; or porous

strata may be found by boring, into which it can be made to run and be dispersed. Along rivers where the fall is very imperceptible, a channel brought from a considerable distance may give such a command as to throw the water over a great extent of surface; and, to carry it off, another channel may be cut, emptying itself at some distance below: thus lands which lie along the banks of a river may be irrigated, although they are actually below the level of the river, and require banks to protect them from inundation.

When the surface to be irrigated is very flat and nearly level, it is necessary to form artificial slopes for the water to run over. The whole of the ground is laid in broad beds undulating like the waves of the sea. The upper part of these beds is quite level from end to end, and here the channel or float which brings the water on is cut. From the edge of this channel the ground is made to slope a foot or two on both sides, and a ditch is cut at the bottom parallel to the float. The whole of the ground is laid out in these beds. All the floats are supplied by a main channel at right angles to the beds, and somewhat above them, and all the ditches or drains run into a main ditch parallel to the main float, and below the lowest drain. The course of the water is very regular. As soon as the flood-gates are opened it flows into all the upper channels, which it fills till they overflow in their whole length. The sloping sides are covered with a thin sheet of running water, which the lower drains collect and carry into the main ditch.

Experience has shown that there are particular seasons when the water has the best effect; a perfect command of it is therefore indispensable, and also a regular supply. During frost, when all dry meadows are in a state of torpor, and the vegetation is suspended, the water-meadows, having a current of water continually flowing over them, are protected from the effect of frost, and the grass will continue to grow as long as the water flows over it. Too much moisture however would be injurious, and the meadows are therefore laid dry by shutting the flood-gates, whenever the temperature of the air is above freezing. By this management the grass grows rapidly at the first sign of spring. Before the dry upland meadows have recovered the effects of frost and begun to vegetate, the herbage of the water-meadows is already luxuriant. As soon as they are fed off or cut for the first crop of hay, the water is immediately put on again, but for a shorter time. A renewed

growth soon appears, and the grass is ready to be cut a second time, when the dry meadows only give their first crop. Thus, by judicious management, three or four crops of grass are obtained in each season, or only one abundant crop is made into hay, and the sheep and cattle feed off the others. The usual way in which the grass of water-meadows is made profitable is by feeding ewes which have early lambs till the middle of April. A short flooding soon reproduces a crop, which is mown for hay in June; another flooding gives an abundant aftermath, which is either mown for hay, or fed off by cows, bullocks, and horses; for at this time the sheep, if pastured in water-meadows, are very subject to the rot. The value of good water-meadows is very great: when the water is suited to irrigation they never require manuring; their fertility is kept up continually, and the only attention required is to weed out coarse aquatic plants.

Water may be carried in small channels through meadows without being allowed to overflow, and in this case the effect is similar to that caused by rivers or brooks which wind slowly through valleys, and produce a rich verdure along their course. This is watering, but not properly irrigating. When this is done judiciously, the effect is very nearly the same as when the land is irrigated; and in hot climates it may be preferable, by giving a constant supply of moisture to the roots, while the plants are growing. The great advantage of water-meadows in England is, not so much the superior quantity of grass or hay which is obtained when they are mown, as the early feed in spring, when all kinds of nutritive fodder are scarce; when the turnips are consumed, before the natural grass or the rye sown for that purpose is fit to be fed off, the water-meadows afford abundant pasture to ewes and lambs, which by this means are brought to an early market. The farmer who has water-meadows can put his ewes earlier to the ram, without fear of wanting food for them and their lambs in March, which is the most trying season of the year for those who have sheep. At that time an acre of good grass may be worth as much for a month as a later crop would for the remainder of the year. When it is intended to form a water-meadow on a surface which is nearly level, or where a fall of only two or three feet can be obtained in a considerable length, the whole of the land must be laid in beds about twenty or thirty feet wide, the middle or crown of these beds being on a level with the main feeders and the bottoms or drains on a level with the

lower exit of the water, or a little above it. To form these beds most expeditiously, if the ground is already in grass, the sod may be pared off and relaid after the beds are formed, by which means the grass will sooner be re-established; but except in very heavy soils, where the grass is some time in taking root, the easiest and cheapest way is to plough the land two or three times towards the centre, and dig out the drain with the spade: the earth out of the drains, and that which is taken out of the upper trench or feeder, may be spread over the bed to give it the proper slope. A roller passed over the bed in the direction of its length will lay it even, and the seeds of grasses being sown over it, the water may be let on for a very short time to make them spring. As soon as the grass is two or three inches above ground, a regular flooding may be given, and in a very short time the sward will be complete. Instead of sowing seeds, tufts of grass cut from old sward may be spread over the newly-formed beds, and they will soon cover the ground. The Italian rye-grass, which has been introduced into this country from Lombardy and Switzerland, grows so rapidly, that if it be sown in February, or as soon as the snow and frost are gone, it will afford a good crop to feed off in April, or to mow for hay by the beginning of May; and after that it may be cut repeatedly during the summer. But where the soil is good and the water abundant, good natural grasses will spring up without much sowing, and soon equal the old water-meadows.

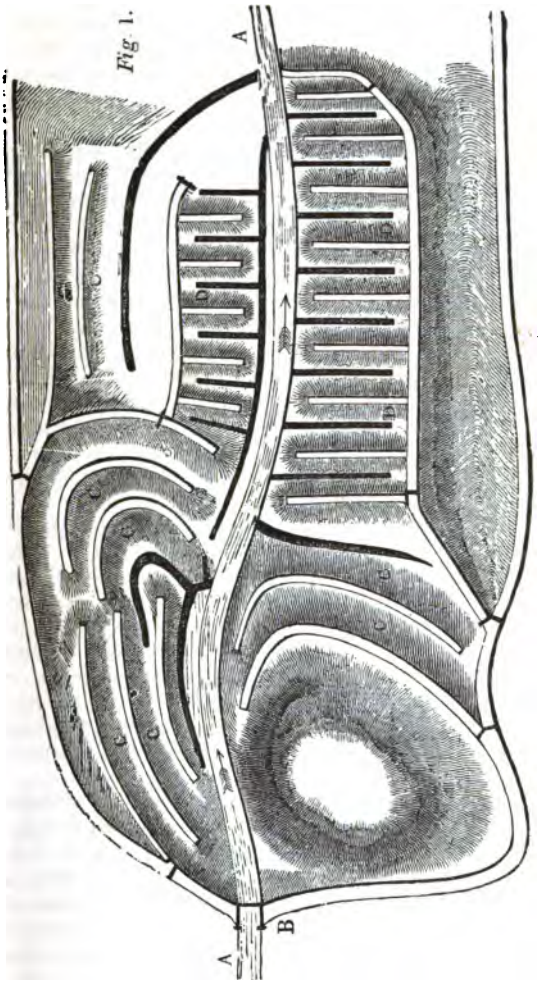
It seems essential to the formation of a good water-meadow that the bottom be porous, and free from stagnant water; hence under-draining is often indispensable before a water-meadow can be established; and a peat-bog, if drained and consolidated, may have water carried over its surface, and produce very good herbage. If the soil is a very stiff clay, draining is almost indispensable where a water-meadow is to be made. The more porous the soil the less depth of water is required, which is not obvious at first sight; but the clay lets the water run over the surface without soaking into the roots, whereas the porous soil is soon soaked to a considerable depth. The water must therefore be longer on the clay than on the sand or gravel, to produce the same effect. If the water is properly applied, all kinds of soil may be converted into fertile water-meadows. On very stiff clays a coat of sand or gravel, where it can be easily put on, will greatly improve

the herbage. It should not be ploughed in, but laid on the surface two or three inches thick: chalk will also improve the herbage.

The usual time of letting on the water on water-meadows is just before Christmas, and it may continue to flow over the land as long as the frost lasts: in mild weather it may be turned off during the day and put on again at night until the frost is gone. The grass will soon begin to grow, and be ready to be fed off. When this is done the water is immediately let on for a short time, and turned off again, to allow the ground to dry after a few days' flooding, and the water is let on again at short intervals. The warmer the air is, the shorter time must the water be allowed to cover the meadows. As soon as the grass is five or six inches long it must be left dry entirely till it is mown or fed off. In summer the floodings must be very short, seldom more than twenty-four hours at a time, but frequent. Thus a great weight of grass may be obtained year after year without any manure being put on the land, care being taken that, where the surface is not quite even, the hollows be filled up with earth brought from another place, or dug out of the drain, if that should be partially filled up with the soil which the water has carried into it. We alluded before to a case where water may remain a considerable time on the land without injury; this is, when there are inundations from rivers, which rise above their beds in spring, and cover the low meadows which lie along their banks. In this case the grass, which has not yet sprung up, is protected from the cold, and if there is a deposit from the water there is a considerable advantage. But when it subides, it must be made to run off entirely, without leaving small pools, by which the grass would invariably be injured. Small ditches or channels are usually dug, by which all the water may run off, unless where the subsoil is very porous, or the land is well under-drained, which is seldom the case in these low meadows, for the drains would be apt to be choked by the earthy deposit from the water. These inundations can sometimes be regulated by means of dykes and flood-gates, in which case they partake of the advantages of irrigation, and also of that deposition of fertilising mud which is called warping.

In the plan (*fig.* 1, p. 169) A A is a river which has a considerable fall, and then flows through a level plain. A considerable channel is cut at B where there is a rapid fall

Fig. 1.


A
B
A
B
C
C
C

over a natural or artificial dam. This channel is carried round a hill and supplies a series of channels, c,c,c, placed below each other, forming catch-work along a declivity. A portion of the water goes on to D, where it supplies the feeders of a regular set of ridges, or beds, made as before described, from which the water returns into the river by a main trench, into which all the drains run.

On the other side of the river, where the slopes lie somewhat differently, there are several examples of catch-work, the black lines representing the drains which receive the water after it has flowed over the surface, and carry it into the river below. It is evident that all the feeders are nearly horizontal, to allow the water to flow over their sides.

Upland pastures are portions of land on which the natural grasses grow spontaneously. The plants which form the natural sward are not confined to the family of the gramineæ, but many other plants, chiefly with perennial roots, form part of the herbage. In the richest soils the variety is exceedingly great. When a sod is taken up, and all the plants on it are examined, the species will be found very numerous, and in the same ground the plants will vary in different years, so as to induce one to conclude, that like most other herbaceous plants, the grasses degenerate when they have grown for a long time on the same spot, and that a kind of rotation is established by nature. It is chiefly in those pastures where the grasses are allowed to grow till they form their seed that this is observable; for when they are closely fed, and not allowed to shoot out a seed-stem, they are less subject to degenerate and disappear. This may be a reason why experienced dairymen are so unwilling to allow their best pastures to be mown for hay Close feeding is always considered the most advantageous both to the cattle and the proprietor.

The only way in which a pasture can be profitable is by feeding stock; and its value is in exact proportion to the number of sheep or cattle which can be fed upon it in a season. Extensive pastures are often measured only by their capacity in this respect. Thus we speak of downs for 1000 sheep; and in Switzerland and other mountainous countries, they talk of a mountain of 40, 60, or 100 cows, without any mention of extent in acres.

When a pasture is naturally rich, the only care required is to stock it judiciously, to move the cattle frequently from one

Fig. 2.

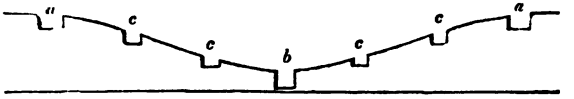
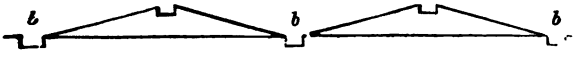


Fig. 2 is the section of catch-work. *a*, *a*, are the feeders; *b*, the drain *c*, *c*, *c*, *c*, intermediate channels which act as feeders and drains.

Fig. 3.



Ridge-work.

Fig. 3 is the section of two adjoining ridges. *a*, *a*, the feeders; *b*, *b*, *b*, the drains.

Fig. 4.

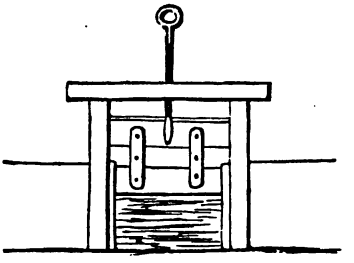


Fig. 4 is a sluice to regulate the flow of water.

spot to another (for which purpose inclosures well fenced are highly advantageous), and to eradicate certain plants which are useless or noxious, such as docks and thistles, furze, broom, briars, and thorns. The dung of the cattle also, when left in heaps as it is dropped, kills the grass, and introduces coarse and less palatable plants. This must be carefully beat about and spread, or carried together in heaps to make composts with earth, to manure the poorer meadows or the arable land. All that is required in rich pastures in which cows and oxen are fed, and which are properly stocked, is to prevent the increase of the coarser and less nutritive plants. Weeding is as important in grass as in arable land; and if it is neglected the consequence will soon be observed by the inferior quality of the feed. The urine of the cattle is the manure which chiefly keeps up the fertility of grass land; and

although in hot and dry weather it frequently burns up the grass where it falls, when it is diluted by showers, the improved appearance of the surface shows that its effect has not been detrimental. To enrich poor meadows there is no manure so effective as diluted urine, or the drainings of stables and dunghills.

When pastures are poor and the herbage is of a bad quality, the cause is in the soil. A poor arid soil is not fitted for grass, nor one which is too wet from the abundance of springs and the want of outlet for the water. The defects can only be remedied by expensive improvements. A soil which is too dry may be improved by cultivation and judicious manuring; but for this purpose it must be broken up and treated for some time as arable land: and it may be a question whether or not the expense of improving the soil will be repaid by the superior quality of the pasture when it is again laid down to grass. In general the poor light soils, if they are worth cultivation, answer better as arable land, especially where the turnip husbandry is well understood. The low wet clay soils may be converted into good pastures by draining them well; and judicious draining on such soils is the most profitable investment of capital.

When old meadows have been neglected, or too often mown, without being recruited by manure or irrigation, they are often overrun with moss or rushes, and produce only a coarse sour grass. In that case, besides draining it if required, the land must be broken up and undergo a regular course of tillage, until the whole of the old sward is destroyed, and a better collection of grasses cover the surface. If this be done judiciously, the pasture will not only be greatly improved in the quality, but also in the quantity of the grass. There is a prejudice against the breaking up of old grass land, which has arisen from the improper manner in which it is frequently effected. The sward when rotten is a powerful manure, and produces great crops of corn; and this tempts the farmer to repeat the sowing of corn on newly broken up lands. The fertility is reduced rapidly; and when grass seeds are sown after several crops of corn, the soil has been deprived of a great portion of the humus and vegetable matter which is essential to the growth of rich grass. The proper method of treating grass land, broken up to improve it, is to take no more corn crops than will pay the expense of breaking up, carting earth, lime, or other substances upon it, to improve the soil, and to lay it down to grass again.

If the soil is fit for turnips, no better crop can be sown to prepare for the grass seeds, which should be sown without a corn crop, except where the sun is powerful, and the seed is sown late in spring: but autumn is by far the best season for sowing grass seeds for permanent pasture. Turnips of an early kind may be sown in May, and fed off with sheep in August or September; and the ground being only very slightly ploughed, or rather scarified, and harrowed fine, the seeds may be sown and rolled in. The species of grass sown must depend on the nature of the soil; but it is impossible to be too choice in the selection. That mixture of chaff and the half-ripe seeds of weeds, commonly called hay seeds, which is collected from the stable lofts, should be carefully rejected, and none but seeds ripened and collected on purpose should be sown. The Trifolium ripens (white clover), the Trifolium medium (cow-grass), Medicago lupinula (trefoil), Lolium perenne (rye-grass), the poas and festucas, are the best kinds of grasses. A very easy way of obtaining good seed is to keep a piece of good meadow shut up from cattle early in spring, carefully weeding out any coarse grasses, and letting the best arrive at full maturity; then mow and dry the crop, and thrash it out upon a cloth. This will give the best mixture of seeds; but some of the earliest will have been shed, and these should be collected separately, or purchased from the seedsmen. Before winter the ground will already be covered with a fine green, if the seed has been plentiful. The quantity per acre of the mixed seeds should not be less than thirty or forty pounds to insure a close pile the next year. If the soil is not naturally rich, liquid manure, or urine diluted with water, should be carried to the field in a water-cart, and the young grass watered with it. This will so invigorate the plants that they will strike and tiller abundantly. They should be fed off by sheep but not too close. The tread of the sheep and their urine will tend to make the pile of grass close; and the year after this the new pasture will only be distinguished from the old by its verdure and freshness.

Butter is the fat or oleaginous part of the milk of various animals, principally of the domestic cow. The milk of the cow is composed of three distinct ingredients, the curd, the whey, and the butter; the two first form the largest portion, and the last the most valuable. The comparative value of the milk of different cows, or of the same cows fed on different pastures, is estimated chiefly by the quantity of butter con-

tained in it; and in this respect some breeds of cows are far superior to others. The union of the component parts of milk is chiefly mechanical, as they separate by subsidence according to their specific gravities, the cream being the lightest, and the curd the heaviest; the curd, however, requires a slight chemical change for its separation from the whey, which at the same time produces a peculiar acid called the lactic acid. From the moment that milk is drawn from the cow it begins to be affected by the air and changes of temperature, and circumstances almost imperceptible to our senses will materially affect its quality: hence the importance of extreme care in every step of the process of the dairy, especially in making butter.

The cows should be milked in the cool of the morning and evening; they should not be much driven immediately before milking, and it is best to bring them to the place of milking some time before the operation begins. In some situations it is better to milk them in the pastures and carry the milk home; in others to drive the cows gently to the cow-stall. In mountainous countries the first mode is generally adopted, because the cows are apt to leap down steep places, and shake the milk in their udder more than is done by carrying it in the pail. The same practice holds good in Holland from another cause, which is the distance of the pastures from the home-stall, and the facility of transporting the milk in small boats, all the best pastures being surrounded by small canals communicating with the greater; thus the milk may be carried several miles without the least agitation. In England, where the pastures frequently surround the habitation of the dairyman, the cows are generally driven home twice a-day, to be milked. As the slightest acidity or putrescence immediately causes an internal chemical action in milk, it is of the utmost importance that the place where the cows are milked, and the persons employed, should be of the greatest purity and cleanliness. The milking-house should be paved with stone or brick, and no litter or dung be permitted to remain there. It should be washed out twice a-day, immediately before each milking. The teats of the cows should be washed clean with water and a sponge.

As soon as the milk is brought into the dairy, it is strained through a fine sieve or cloth, and it is then poured into shallow pans or troughs lined with lead. The best pans are of metal, either of iron, carefully tinned, or of brass. Such

pans are cool in summer, and in winter allow of the application of heat, which is often very useful to make the cream rise. When leaden troughs are used they are generally fixed to the wall, and have a slight inclination towards one end, where there is a hole with a plug in it, by drawing which the thin milk is allowed to run off slowly, leaving the cream behind, which runs last through the hole into the pan placed under to receive it. The milk in the pans or troughs is generally four or five inches in depth, which is found most conducive to the separation of the cream. The place where the milk is set should have a thorough draft of air by means of opposite wire windows. The sun should be carefully excluded by high buildings or trees, and the floor, which should always be of brick or stone, should be continually kept moist in summer, that the evaporation may produce an equal cool temperature. A small stove in winter is a great advantage, provided smoke or smell be most carefully avoided, and the temperature be carefully regulated by a thermometer. In Switzerland men are chiefly employed to milk the cows, and in all the process of the preparation of butter and cheese. The women only clean the utensils, and carry green food to the cows when they are kept in the stable. When the milk has stood twelve hours, the finest parts of the cream have risen to the surface, and if they are then taken off by a skimming-dish, and immediately churned, a very delicate butter is obtained; but in general it is left twenty-four hours, when the cream is collected by skimming, or the thin milk is let off by taking out the plug in the troughs. All the cream is put into a deep earthen jar, which should be glazed, but not with lead; stone ware is the best. More cream is added every day till there is a sufficient quantity to churn, which in moderate dairies is every two days. It is usual to stir the cream often, to encourage a slight acidity, by which the process of churning is accelerated. This acidity is sometimes produced by the addition of vinegar or lemon-juice; but however this may facilitate the conversion of the cream into butter, the quality is decidedly injured by it, especially butter which is to be salted. It has been asserted by some authors that butter will not separate from the butter-milk until acidity is produced, and, no doubt, there is more or less of lactic acid in all butter-milk; but perfectly fresh cream, which has stood only one night and is churned early next morning, will generally produce excellent butter in a quarter of an hour or

twenty minutes in summer, and no acid taste can be discovered in the butter-milk. The change by which the butter is separated in a solid form is accompanied by the development of heat in churning.

The common method employed to separate the butter from the thinner portion of the cream is by strong agitation. In small quantities this may be done in a bottle; but the common instrument is the *churn*, which is a wooden cask, rather wider at bottom than at the top, covered with a round lid with a hole in the centre. Through this hole passes a round stick about four feet long, inserted in the centre of a round flat board with holes in it; the diameter of this board is a little less than that of the top of the churn. Various improvements have been made in this machine. The cream should not fill above two-thirds of the churn. By means of this stick, held in both hands and moved up and down, the cream is violently agitated, passing through the holes in the board and round its edge every time the stick is raised or depressed, and thus every portion is brought into contact with the air. In the course of an hour's churning, more or less according to circumstances, small kernels of butter appear, which are soon united by the pressure of the board against the bottom of the churn, and form a mass of solid butter. The butter is collected with the hand, and placed in a shallow tub for the next operation. The butter-milk is set aside for the pigs, or for domestic use. The butter is still mixed with some portion of butter-milk, but much of its quality for keeping depends on their perfect separation. The most usual way is to spread it thin in a shallow tub, beating it with the hand or a flat wooden spoon, and washing it repeatedly with clear spring water, until all milkiness disappears in the water that is poured off. Some experienced dairymen pretend that the butter is deteriorated by much washing, and therefore they express the butter-milk by simply beating the butter with the hand, kept cool by frequently dipping it in cold water, or with a moist cloth wrapped in the form of a ball, which soaks up all the butter-milk, and leaves the butter quite dry. This operation requires the greatest attention, especially in warm weather, and no person should work the butter who has not a very cool hand. The less it is handled the better, and therefore a wooden spoon or spatula is much to be preferred.

When it is entirely freed from the butter-milk, and of

a proper consistency, it is divided into portions of the weight required, if it is intended to be sold fresh. But the greatest part of the butter that is made, especially at a distance from large towns, is immediately salted and put into casks, which usually contain fifty-six pounds, and are called firkins. The quality of the salt used is of great importance; if it be pure, the butter will keep its flavour a long time, but when it is impure and contains bitter and deliquescent salts the butter soon becomes rancid. The Dutch are very particular in this point. They use a kind of salt which is made by slow evaporation, and perfectly crystallised. The salt is intimately mixed with the butter. From 3 to 5 lbs. are sufficient for a firkin of 56 lbs.* The casks are made of clean white wood. They are carefully washed inside with strong brine made hot, and rubbed over with salt. The butter, being quite dry, is pressed close into the cask, a small layer of salt having been first put on the bottom. Every addition is carefully incorporated with the preceding portion. If there is not a sufficient quantity to fill the cask at once, the surface is made smooth, some salt is put over it, and a cloth is pressed close upon it to exclude the air. When the remainder is added, at the next churning, the cloth is taken off, and the salt, which had been put on the surface, is carefully removed with a spoon. The surface is dug into with a small wooden spade, and laid rough, and the newly salted butter is added and incorporated completely. This prevents a streak, which would otherwise appear at the place where the two portions joined. When the cask is full some salt is put over it, and the head is put in. If the butter was well freed from all the butter-milk, and the salt mixed with it was quite dry, it will not shrink in the cask, and it will keep its flavour for a long time. Should there be an appearance of shrinking, the cask must be opened, and melted butter poured round it so as to fill up the interstices between the butter and the cask. There is a mode of preserving butter for domestic use without salt, in the following manner:—The butter is set in a clean pan over the fire, and melted very gently; it is not allowed to boil, but is heated very nearly to the boiling point. Experience has shown this heat to be attained when the reflection of the white of the eye is distinctly seen on the surface of the butter on looking

* The following mixture has been found superior to salt alone in curing butter:—half an ounce of dry salt pounded fine, two drachms of sugar, and two drachms of saltpetre, for every pound of butter.

down into the pan. All the watery particles are then evaporated, and the curd, of which a portion always remains in the butter, and which is one cause of its becoming rancid, falls to the bottom. The clear butter is poured into an earthen vessel and covered over with paper; and a bladder or a piece of leather is tied over the jar to exclude the air. When it is cooled, it much resembles hog's lard. It has lost some of its flavour, but it is much superior to salt butter for culinary purposes, and especially for pastry.

The Devonshire method of making butter is peculiar to that county. The milk, instead of being set for the cream to rise, is placed in tin or earthen pans, holding about eleven or twelve quarts each. Twelve hours after milking, these pans are placed on a broad iron plate, heated by a small furnace. The milk is not allowed to boil, but a thick scum rises to the surface. As soon as small bubbles begin to appear, where a portion of this scum is removed with a spoon, the milk is taken off and allowed to cool. The thick part is taken off the surface, and this is called *clouted cream:* it is a sweet, pleasant substance, more solid than cream, but not so solid as butter, and is generally considered a dainty. A very slight agitation converts it into real butter, after which it is treated exactly as we have before described.

Another method of making butter, which is more generally adopted, is to churn the milk and cream together. This method is pursued in parts of Holland, Scotland, and Ireland, and is said to produce a greater abundance of butter from the same quantity of milk. In the Dutch method the milk is put into deep jars in a cool place, and each *meal*, or portion milked at one time, is kept separate. As soon as there is a slight appearance of acidity, the whole is churned in an upright churn, which, from the quantity of milk, is of very large dimensions. The plunger is worked by machinery moved by a horse, or sometimes by a dog walking in a wheel, which he turns by his weight. When the butter begins to form into small kernels, the contents of the churn are emptied on a sieve, which lets the butter-milk pass through. The butter is then formed into a mass, as described before.

It is an acknowledged fact, that such are the niceties of the dairy, that great experience alone can insure a produce of superior quality, and this experience would be more readily acquired if the circumstances were accurately observed and noted. We would recommend, to those who have extensive

dairies, to mark by the thermometer the temperature of the milk and cream in the different stages of the process; occasionally to test the acidity of the butter-milk by means of alkalis; and to note any peculiarity in the atmosphere by an electrometer. A few observations, carefully noted, repeated, and compared, would throw more light on the true causes which favour or oppose the production of good butter, than all the guesses that have hitherto been made.

The quality of the butter depends materially on the nature of the pasture. The best is made from cows fed in rich natural meadows. Certain plants, which grow in poor and marshy soils, give a disagreeable taste to the butter. The common notion that the yellow flower called the butter-cup gives colour and flavour to butter is a mistake: cows never crop the flower if they can avoid it, and the whole plant is acrid and unpalatable. When cows are fed with cut grass in the stable, the butter is inferior, except in the case of some artificial grasses, such as lucern. Turnips and other roots given to cows in winter communicate more or less of a bad taste to butter, which is corrected in some degree by means of a small quantity of water and saltpetre added to the milk; and also, it is said, by giving salt to the cows with their food. But there is no butter made in winter equal to that which is made when the cows are fed entirely with good meadow hay, especially of the second crop, called aftermath hay, which contains few seed-stalks.

The yellow colour of May butter is frequently imitated artificially by mixing some ground arnotto root, or the juice of carrots, with the cream. This is easily detected by the taste of the butter, which is not improved by it, and has not the peculiar flavour of fine grass butter; but in other respects it is a harmless addition. Some cows give a much yellower cream than others, especially the Alderney cows; and the butter made from it is of a peculiarly fine flavour. When a cow has lately calved, the milk is also much yellower, but this soon goes off, if it be not the natural colour; and the butter made by mixing this with other milk, although of a deeper colour, is not improved by it.

According to the accounts of the produce of butter from different countries and various breeds of cows, we may state that, on an average, four gallons of milk produce 16 ounces of butter; and to make the feeding of cows for the dairy a profitable employment in England, a good cow should pro-

duce six pounds of butter per week in summer, and half that quantity in winter, allowing from six weeks to two months for her being dry before calving; that is, 120 lbs. in twenty weeks after calving, and 80 lbs. in the remainder of the time till she goes dry,—in all about 200 lbs. in the year. If she produces more, she may be considered as a superior cow; if less, she is below par. To produce this quantity the pasture must be good, and if we allow three acres to keep a cow in grass and hay for a year, which is not very far from the mark, the butter made will produce about £10, at the distance of fifty miles from London, if it is sold in a fresh state, and the calf about 15*s.* at a week old. This does little more than pay the rent and expenses; the profit must be made by feeding pigs, or making skim-milk cheese.

The quality of the butter produced in England and in Holland is considered the best. A considerable quantity of Dutch butter is exported, but all that is produced in England is consumed at home, in addition to large quantities imported from Ireland and the continent of Europe. The quantity imported has been for some time progressively increasing.

Cheese.

In the making of cheese there are certain general principles which are essential, but slight variations in the process produce cheeses of very different qualities; and although the most important circumstance is the nature of the pasture on which the cows are fed, yet much depends on the mode in which the different stages of the fabrication are managed; and hence the great superiority of the cheeses of particular districts or dairies over those of others, without any apparent difference in the pasture. In those countries where the cows are chiefly kept tied up in stalls, and are fed with a variety of natural and artificial grasses, roots, and vegetables, superior cheese is often made.

The first process in making cheese is to separate the curd from the whey, which may be done by allowing the milk to become sour; but the cheese is inferior in quality, and it is difficult to stop the acid fermentation and prevent its running into the putrefactive. Various substances added to milk will soon separate the curd from the whey. All acids curdle milk. Muriatic acid is used with success for this purpose in Holland. Some vegetables contain acids which readily coagulate milk, such as the juice of the fig-tree, and the flowers of the Galium

verum, or yellow lady's bed straw, hence called *cheese-rennet.* Where better rennet cannot be procured, they may be substituted for the best curdler of milk, which is the gastric juice of the stomach of a sucking calf. This juice rapidly coagulates the milk as the calf sucks; and the only difficulty is in collecting and keeping it from putrefaction, which begins from the instant the stomach is taken from the calf. The preparation of the *rennet*, as it is called, is a most important part of the process of cheese-making. The following may be considered as the simplest, and perhaps the best. As soon as a sucking calf is killed, the stomach should be taken out, and if the calf has sucked lately, it is all the better. The outer skin should be well scraped, and all fat and useless membranes carefully removed. It is only the inner coat which must be preserved. The coagulated milk should be taken out and examined; and any substance besides curd found in it should be carefully removed. The serum left in it should be pressed out with a cloth. It should then be replaced in the stomach with a large quantity of the best salt. Some add a little alum and sal prunella; others put various herbs and spices, with a view of giving the cheese a peculiar flavour; but the plain simple salting is sufficient. The skins or vells, as they are called, are then put into a pan, and covered with a saturated solution of salt, in which they are soaked for some hours; but there must be no more liquor than will well moisten the vells. They are afterwards hung up to dry, a piece of flat wood being put crosswise into each to stretch them out. They should be perfectly dried, and look like parchment. In this state they may be kept in a dry place for any length of time, and are always ready for use. In some places, at the time of making cheese, a piece of vell is cut off, and soaked for some hours in water or whey, and the whole is added to the warm milk. In other places, pieces of vell are put into a linen bag, and soaked in warm water, until the water has acquired sufficient strength, which is proved by trying a portion of it in warm milk. The method employed in Switzerland is as follows:—A dry vell is taken and examined; it is scraped with a knife, and where any veins or pieces of tough membrane appear, they are removed. The whole surface is examined and washed carefully, if any dust or dirt has adhered to it; but otherwise it is only wiped with a cloth. A handful of salt is then put into it, and the edges of the vell are folded over and secured with a wooden skewer stuck through it. In this state it forms a ball

of about three inches diameter, and is laid to soak twenty-four hours in a dish containing about a quart of clear whey, which has been boiled, and all the curd taken out. The next day the vell is well squeezed, and put into fresh whey; the first infusion being put into a proper vessel, the second is afterwards mixed with it, and bottled for use. Half a pint of this liquor, of a proper strength, is sufficient to curdle 40 gallons of milk. Experience alone enables the dairyman to judge of the strength of his rennet; for this purpose he takes in a flat ladle some milk which has been heated to about 95 degrees of Fahrenheit, and adds a small measure of rennet. By the rapidity with which it curdles, and by the form of the flakes produced, he knows its exact strength, and puts more or less into the caldron in which the milk is heated for curdling.

There are different kinds of cheese, according to the mode of preparing it: soft and rich cheeses are not intended to be kept long; hard and dry cheeses are adapted to be kept and stored for provisions. Of the first kind are all cream cheeses, and those soft cheeses, called Bath cheeses and Yorkshire cheeses, which are sold as soon as made, and if kept too long become soft and putrid. Stilton and Gruyère cheeses are intermediate; Parmesan, Dutch, Cheshire, Gloucestershire, and similar cheeses, are intended for longer keeping. The poorer the cheese is, the longer it will keep; and all cheese that is well cleared from whey, and sufficiently salted, will keep for years. The small Dutch cheeses, called Edam cheeses, are admirably adapted for keeping, and form an important article in the victualling of ships.

The Gruyère and Parmesan cheeses only differ in the nature of the milk, and in the degree of heat given to the curd in different parts of the process. Gruyère cheese is entirely made from new milk, and Parmesan from skimmed milk. In the first nothing is added to give flavour: in the latter saffron gives both colour and flavour; the process in both is exactly similar. A large caldron, in the shape of a bell, capable of holding from 60 to 120 gallons of milk, hangs from an iron crane over a hearth where a wood fire is made. The milk, having been strained, is put into this caldron, and heated to nearly blood-heat (95° to 100°). It is then turned off the fire, and some rennet, prepared as stated above, is intimately mixed with the warm milk by stirring it with the hand, in which is held a flat wooden skimming-dish, which is turned round in the milk while the hand and arm stir it. A cloth is then laid

over the caldron, and in half an hour, more or less, the coagulum is formed. This is ascertained by pressing the skimming-dish on the surface, when the whey will appear on the part pressed. If it is longer than an hour in coagulating, the milk has been too cool, or the rennet not strong enough. When the curd is properly formed, it is cut horizontally in thin slices by the same skimming-ladle. Each slice as it is taken off, is poured along the side of the caldron which is nearest to the operator; by this means every portion of the curd rises successively to the surface, and is sliced thin. The whole is then well stirred, and the caldron is replaced over the fire. A long staff, with a small knob of hard wood at the end, and which has smaller cross pieces or sticks passed through holes in it at right angles to each other near the end, is now used to stir and break the curd, and the heat is raised to about 135°, which is as hot as the arm can well bear, even when used to it. The cauldron is again swung off the fire, and the curd is stirred with the staff, which is moved round with a regular rotatory motion, the knob running along the angle formed with the side by the bottom of the caldron, which is in the form of a bowl. After stirring in this manner nearly an hour, the curd is found divided into small dies about the size of a pea, which feel elastic and rather tough under the finger. Experience alone can teach the exact feel they should have. The whey, of which a portion is removed occasionally, now floats at top, and the curd is collected in the bottom by giving a very rapid rotatory motion to the contents of the caldron by means of the staff. A cloth is now introduced into the bottom, and all the curd collected over it; it is raised by the four corners, and laid on an instrument like a small ladder, which is placed across the mouth of the caldron. The whey runs out through the cloth, which is a common cheese-cloth, woven with wide interstices; and the curd in the cloth is placed in a shape or hoop, made of a slip of wood, four inches and a half wide, the two ends of which lie over each other, so that the diameter can be increased or lessened. A cord fixed to one end of the hoop is passed with a loop over hooks on the outer surface of the other end, and prevents the ring from opening more than is required. The curd is pressed into this ring with the hands, and the ends of the cloth are folded over it. A round board, two inches thick, and strengthened by cross pieces nailed on it, is placed over the curd, and the press let down upon it.

The cheese-press is a simple long board or frame, forming a lever, loaded at one end, and moving in a frame at the other; it is lifted up by another lever connected with it, and let down on a strong stick, which stands with its end on the centre of the board last mentioned. Thus the weight is easily removed or replaced. The hoop containing the cheese is placed on a similar board, and from it the table of the press slopes towards a wooden trough, which receives the whey as it runs out. In an hour after this, the curd is examined; the edges, which are pressed over the ring, are pared off, and the parings are put on the centre of the cheese; a fresh cloth is substituted, and the whole cheese is turned. The ring, which opens readily by unhooking the cord, allows the cheese to come out, and is put on again and tightened. This is repeated two or three times in the day. In the evening a small portion of finely powdered salt is rubbed on each side of the cheese, and it remains in the press till the next morning. It is now again rubbed with salt, and placed on a shelf with a loose board under it. The wooden ring remains on the cheese for two or three days, and is then taken off.

During the next six or eight weeks the cheeses are turned and wiped every day, and a small quantity of fine salt is sifted on the surface, and rubbed in with the hand until they will take no more. The cheese-room is always very cool, and little light is admitted. A free circulation of air is essential. The cheeses are in perfection in about six months, and will keep two years. A quantity of elastic fluid is disengaged in the ripening, and forms those round eyes which are a peculiar feature in these cheeses. The smaller and rounder the eyes, the better the cheese is reckoned. They should contain a clear salt liquor, which is called the tears; when these dry up, the cheese loses its flavour.

In Cheshire the making of cheese is carried on in great perfection, and the greatest pains are taken to extract every particle of whey. For this purpose the curd is repeatedly broken and mixed, the cheeses are much pressed, and placed in wooden boxes which have holes bored into them. Through these holes sharp skewers are stuck into the cheese in every direction, so that no particle of whey can remain in the curd. The elastic matter formed also escapes through these channels, and the whole cheese is a solid mass without holes, which in this cheese would be looked upon as a great defect. The salt is intimately mixed with the curd, and not merely rubbed on

the outside. This checks internal fermentation, and prevents the formation of elastic matter.

Gloucester and Somersetshire cheeses are similarly made, with this difference, that the curd is not so often broken or the cheese skewered, and a portion of the cream is generally abstracted to make butter. After the curd has been separated from the whey and is broken fine, warm water is poured over it, for the purpose of washing out any remaining whey, or perhaps to dissolve any portion of butter which may have separated before the rennet had coagulated the milk.

Stilton cheese is made by adding the cream of the preceding evening's milk to the morning's milking. The cream should be intimately incorporated with the new milk; great attention should be paid to the temperature of both, as much of the quality of the cheese depends on this part of the process. To make this cheese in perfection, as much depends on the management of the cheese after it is made as on the richness of the milk. Each dairy-woman has some peculiar method which she considers the best; and it is certain that there is the greatest difference between cheeses made in contiguous dairies. The rennet should be very pure and sweet. When the milk is coagulated, the whole curd is taken out, drained on a sieve, and very moderately pressed. It is then put into a shape in the form of a cylinder, eight or nine inches in diameter, the axis of which is longer than the diameter of the base. When it is sufficiently firm, a cloth or tape is wound round it to prevent its breaking, and it is set on a shelf. It is occasionally powdered with flour, and plunged into hot water. This hardens the outer coat and favours the internal fermentation, which ripens it. Stilton cheese is generally preferred when a green mould appears in its texture. To accelerate this, pieces of a mouldy cheese are sometimes inserted into holes made for the purpose by the scoop, called a *taster*, and wine or ale is poured over for the same purpose; but the best cheeses do not require this, and are in perfection when the inside becomes soft like butter, without any appearance of mouldiness. In making very rich cheeses the whey must be allowed to run off slowly, because, if it were forced rapidly, it might carry off a great portion of the fat of the cheese. This happens more or less in every mode of making cheese. To collect this superabundant butter, the whey is set in shallow pans, as is done with milk when butter is made;

and an inferior kind of butter called *whey butter* is made from the cream or fat skimmed off.

Cheeses are frequently coloured—a practice which probably arose from the notion of making the cheese look richer; but now it deceives no one. Yet if some cheeses were not coloured they would not be so marketable, owing to the association that subsists between the colour and the quality of the cheese. The substance used for colouring is most commonly arnotto. It is ground fine on a stone, and mixed with the milk at the time the rennet is put in. The juice of the orange carrot, and the flower of marigold, are also used for this purpose. Chedder, a cheese made in Somersetshire, which is highly prized, Stilton, Derby, and some other cheeses, are never coloured: Cheshire slightly; but Gloucester and North Wiltshire deeply. Foreign cheeses are only coloured very slightly, if at all. The Dutch cheeses are made in a very similar manner to the Gloucester cheeses, but the milk is generally curdled by means of muriatic acid or spirits of salt: and great care is taken to prevent fermentation, and to extract the whole of the whey. For this purpose the curd is repeatedly broken and pressed; and before it is made up into the round shape in which it is usually sold, the broken curd is well soaked in a strong solution of common salt in water. This diffuses the salt throughout the whole mass, and effectually checks fermentation. When the cheeses are finally pressed, all the whey which may remain is washed out with the brine; salt is likewise rubbed over the outside, and they are set to dry on shelves in a cool place. The flavour of the cheese is perhaps impaired by the stoppage of the fermentation; but it never heaves, and it acquires the valuable quality of keeping well even in warm climates. From the place where this cheese is commonly made, it is known by the name of Edam cheese. A finer cheese is made at Gouda and other places, by imitating the process in making Gruyère cheese; but this cheese is always full of small cavities, and will not keep so long as the Edam. The cheese most commonly met with in Holland is a large kind of skim-milk cheese, which is made very like Cheshire cheese. It grows hard and dry, and has not much flavour. To supply this defect, cummin seeds are mixed with the curd, which those who are accustomed to it consider a great improvement. On the whole, it is a better cheese than our Suffolk skim-milk cheese, and forms an important part of the provisions usually stored for a Dutch family. In France the

Roquefort cheese is compared to our Stilton, but is much inferior, although a good cheese. The little cheeses made from cream and folded in paper, called Neufchâtel cheeses, are imported from France as a delicacy. They can be easily imitated, being nothing more than cream thickened by heat, and pressed in a small mould. They undergo a rapid change, first becoming sour and then mellow, in which state they must be eaten

The green Swiss cheese, commonly called *Schabzieger*, is produced in the canton of Glarus. The curd is pressed in boxes, with holes to let the whey run out; and when a considerable quantity has been collected and putrefaction begins, it is worked into a paste with a large proportion of a certain dried herb reduced to powder. This herb, called in the country dialect *Zieger kraut* (curd-herb), is the Melilotus officinalis, which is very common in most countries, and has a peculiar aromatic flavour in the mountains of Switzerland. The paste thus produced is pressed into moulds of the shape of a common flower-pot, and the putrefaction being stopped by the aromatic herb, it dries into a solid mass, which keeps unchanged for any length of time. When used it is rasped or scraped, and the powder, mixed with fresh butter, is spread upon bread. It is either much relished or much disliked, like all those substances which have a peculiar taste and smell.

When a cheese which has been much salted and kept very dry is washed several times in soft water, and then laid in a cloth moistened with wine or vinegar, it gradually loses its saltness, and from being hard and dry, becomes soft and mellow, provided it be a rich cheese. This simple method of improving cheese is worth knowing. It is generally practised in Switzerland, where cheeses are kept stored for many years, and if they were not very salt and dry they would soon be the prey of worms and mites A dry Stilton cheese may thus be much improved.

CHAPTER VI.

In entering upon the subject of the diseases of cattle, our plan will be to render it acceptable to the farmer or grazier, who pretends to no anatomical knowledge, but yet is glad of some advice by which to be guided in the treatment of the more ordinary cases of malady which demand his attention. He cannot always have instant recourse to a veterinary surgeon, and in slight disorders may not deem it needful, though we must say we doubt the soundness of his policy. It is by the veterinary surgeon only that all operations must be performed; and in cases of severe accidents his skill must be called into requisition. Nothing is more to be reprobated than the practice, unhappily still too general, of applying to a farrier, ignorant alike of anatomy, physiology, and the symptoms of disease; or to a druggist, who is in the habit of compounding drenches of various nostrums (many worse than useless), when the lives of cattle are at stake. This practice is the more inexcusable, when professed and well-educated veterinary practitioners are within call of the farmer,—and of such few towns or rural districts are now destitute. It is not, however, for the veterinary surgeon that we now write; it is, as we have said, for the farmer, and that by way of guide and advice.

The ox, like the human subject, is liable to numerous maladies, arising from different causes: to fever, to inflammatory affections of the brain, lungs, liver, intestines, and other organs; to paralysis, and other diseases connected immediately with the nervous system; to various chronic diseases, and to sudden derangement of the complicated digestive apparatus from improper food. To these classes of diseases others might be added,—setting aside injuries from external causes, which are constantly happening.

Before entering into these more fully, a few preliminaries

relative to the constitutional temperament of the domestic ox may not be out of place; it is indeed a point that demands our notice.

Comparing the ox with the horse, neither the nervous nor the arterial system of the former exhibits the same energy as that of the latter. The brain of the ox is small; the nervous energies are soon exhausted, nor are they so easily recruited by rest, as in the horse: the ox will not endure severe labour, especially if hurried, and will frequently sink down with exhaustion; in illness it is sooner prostrated than the horse, and more subject to paralytic weakness. The chest, moreover, has less volume, and the free play of the lungs is more frequently oppressed by the distension of the stomach, which, with the abdominal viscera, occupy more room in proportion, as being of comparatively predominant importance. The ox, indeed, is expressly formed for giving milk and flesh as the food of man; and though this animal has been employed in labour from the earliest times, it was for slow labour, with frequent intervals of rest.

The pulse of the ox is quicker than that of the horse, ranging from fifty to sixty, in a state of health; in the horse it is under forty. In cattle, near the time of calving, the pulse often rises to eighty or eighty-five, and in milch cows is always quicker than in oxen. The arteries generally, those arising from the heart immediately being excepted, are comparatively much smaller than in the horse; while, on the contrary, the veins are far larger, and indeed the whole venous system is more developed, and especially so in good milch cows, in which the subcutaneous abdominal vein (or milk vein), is taken as a criterion of their qualities.

It is not always an easy thing to feel the arterial pulse in cattle: this may, however, be generally effected at one of the following arteries:—The *submaxillary*, a branch of the carotid which dips under the angle of the lower jaw; the *temporal artery* running up between the eye and ear; or the *anterior auricular artery*, which supplies the anterior muscles of the ear. The pulsation of the heart itself may be tried by placing the hand on the left side of the chest, a little within and behind the elbow. The warmth or unnatural coldness of the ears, and the heat of the blood at the roots of the horns, are points to be attended to in conjunction with the pulse.

When blood is abstracted from cattle, the external jugular vein is that commonly selected for the lancet; it is very

apparent, running along the side of the throat from the angle of the lower jaw. A skilful operator will use a strong broad-shouldered lancet, but the farmer contents himself with the fleam, which in his hands is more certain and safe; but, whether the lancet or the fleam be employed, the neck should not be strapped or corded round, as the pressure, being alike on both sides of the neck, impedes the return of the blood from the head; firm pressure of the fingers a little below the spot where the puncture of the vein is to be made, will suffice to render it prominent. Occasionally, in affections of the mouth or nasal organs, a flow of blood is obtained from the vessels of the palate by free incisions on the latter; and sometimes certain veins of the limbs (the cephalic of the fore limb, the saphena of the hind limb) are selected. In inflammatory diseases prompt and efficient bleeding is indispensable; and this should be carried so far at once as to affect the circulation, and thereby, if possible, arrest the course of the disease. Timid bleeding, rendering its repetition needful, is to be eschewed; but at the same time attention should be paid to the age, constitution, and vigour of the animal. In an aged cow, which has had numerous calves, less loss of blood will suffice than in a young one, whose constitution is unimpaired, or an ox in full vigour. From the latter, two gallons of blood may be extracted, while from the first, half the quantity will probably suffice. To bleeding, aperient medicine should be added; and in this we can scarcely ever do wrong, for cattle bear aperients, especially with a little carminative, to excite the action of the stomachs, better than the horse, in whom they sometimes produce dangerous irritation of the alimentary canal.

It is to the inflammatory diseases of cattle, which demand prompt measures, carried out with boldness, yet discretion, that we shall first direct our attention

SIMPLE FEVER.

Cattle, especially in swampy lands, are subject to attacks of fever; this is sometimes pure or idiopathic, and occasionally assumes an intermittent form; but if suffered to proceed, some vital organ, predisposed to inflammation, becomes as it were the centre of irritation, and the case may terminate fatally.

In simple fever the animal is languid and dull, it refuses food, the hide loses its mellowness, the flanks heave, the

horn is hot at its base, and the pulse is hard and quick. In a day or two the animal seems better, but after a brief interval the symptoms return with increased violence, the breathing becomes more laborious, rumination ceases, though the animal often lies down—but this is from weakness—and the mouth is dry and hot. Mischief is now coming on, and, most probably, in the form of inflammation of the lungs.

This disease is, perhaps, the most prevalent in autumn, when cattle are exposed in damp lands, and heavy cold fogs set in at night, or partial frost which crisps the grass, yet luxuriant though harsh. It may arise from miasmatous exhalations, or from water putrescent with decomposed leaves or other vegetable matters. At the beginning of the disease, the judicious farmer will remove the animal, and take away some blood, giving afterwards a cathartic dose, composed of from eight to twelve ounces of Epsom salts (sulphate of magnesia), two or three ounces of sulphur, two drachms of powdered ginger, the whole mixed in a quart of warm water; half a pint of linseed oil may be added. The diet must be reduced and mashes given, with repetitions of the cordial purgative, till the animal regains its wonted cheerfulness, and every symptom has disappeared.

It not unfrequently happens that fever, appearing at first in a slight and simple form, suddenly puts on a decidedly *inflammatory* character; or, on the contrary, assumes a low *typhoid* form, in which, as in the human subject, the vital energies give way under the process of what is not unaptly termed a secretly consuming fire.

INFLAMMATORY FEVER.

This disease, called black quarter, quarter-ill, evil-joint, blood-sticking, and other meaningless names, is often prevalent in certain districts, and during certain years occasions extensive mortality. Young cattle are the most commonly seized, their habit being more disposed to plethora than aged subjects. Sometimes the disease appears to be epidemic, or at least attacks whole herds turned imprudently from spare diet upon luxuriant pastures, subjected to wet cold nights, while the blood vessels are receiving an inordinate addition of the vital fluid from the assimilating system.

So rapidly does this fever come on, that the slight precursory febrile symptoms are often unnoticed; and so quick

is its course that there is little time, or none, to have recourse to remedies. Generally, however, the ordinary symptoms of simple fever may be noticed, but these all at once assume a most aggravated form; the animal labours under a general venous congestion, and dies a mass of putridity.

The first stage of this disease is highly inflammatory. The pulse is quick, hard, and strong, the eyes are inflamed and protruding; the tongue is dry and parched; the breathing laboured and quick, with deeper inspirations at intervals; the head is stretched forth, the neck at full extent, and an agitated expression marks the countenance; the appetite is gone, and of course rumination suspended. This is the first, or perhaps, in reality, the second stage; at all events it is the first noticed, and these symptoms are apparent, though in particular cases some may be more marked than others. What is now to be done? first, bleed, aiming at once for all, and bleed freely, even to fainting: then give active aperients; and if necessary bleed again, but now with caution, and not within six or eight hours after the first operation: for the strength of the animal, and the state of its exhaustion, are points to be kept in mind; but recourse must be had to a second and copious bleeding unless a decided improvement has already manifested itself. Sedatives should succeed the brisk aperients: half a drachm or a drachm of digitalis (foxglove leaves properly dried and powdered), one drachm of tartarized antimony, and four drachms of nitre, mixed in any demulcent liquid, may be given twice a day. A seton of black hellebore should be inserted into the dewlap. Should the disease continue, the animal utters low distressing moans, and is generally unconscious of surrounding objects; it will stand gasping, but without change of posture, for a considerable time; and when it attempts to move it staggers and reels, and the hind quarters seem affected with a partial paralysis; the loins are so tender that the slightest pressure produces pain; and swellings arise on the shoulders, back, and limbs, which, when pressed, make a crackling noise. These swellings arise from an effusion of some gas into the cellular tissue, the consequence of a putrescent state of the blood. Debility now rapidly increases, and the animal drops; perhaps it rises again, but it again falls prostrate, and after making vain attempts to recover its limbs, sinks into a comatose state, and dies. Sloughing ulcers, in this stage, often spread over the abdomen, the limbs, and other parts; the

mouth, muzzle, and tongue are ulcerated; a sanious offensive fluid drops from the mouth and nose; and the alvine excretions are extremely fetid, and mixed or streaked with blood. In this state the poor beast may continue two or even three days, till relieved by death. Farmers call these ulcerations and their concomitants, *black quarter;* and the paralytic state of the limbs, *quarter-evil*, or *joint-murrain.*

If the disease be not checked in its inflammatory stage, the chance of saving the animal, when congestion of every organ, brain, lungs, heart, liver, intestines, &c., from the violent excess of arterial action has commenced, is very precarious. The first object will be to relieve the congestion under which the vital powers of the system succumb; if previous bleeding has been neglected there is no room for hesitation, for, weak as the animal may appear, the system must be relieved; but if the animal has been freely bled and purged, the question will arise, How far will it be prudent to extract more blood? As a general rule, blood should be taken, and the state of the pulse should be watched: if it become softer there is still hope; but if it fail, and become more and more indistinct, the flow of blood should be stopped. Active aperients should be administered, beginning with a pound dose of Epsom salts, succeeded by half-pound doses at intervals, until the bowels are acted upon Nor should injections be neglected in aid of the medicine. These may consist of half-a-pound of common salt, and a little oil, in four quarts of water or thin gruel. The swellings of the limbs and loins should be fomented with hot water, and the fetid sloughing ulcers washed repeatedly during the day with a solution of chloride of lime (half-an-ounce of the chloride in a gallon of water); the muzzle and tongue should be similarly treated. Some practitioners recommend that a pint of this solution be gently horned down into the stomach, perhaps more than once; for if there be hoove, or distension of that organ by gas, this solution will combine with it, prevent its further formation, and correct the fœtor, which is often almost unbearable.

After these remedies, and supposing the bowels to have been well cleared, mashes of thick gruel should be offered, or even gently poured down the gullet.

If the ulcers cleanse, the swellings disappear, and the animal begins to eat,—indications of incipient recovery,—tonics may be given, but not previously. One or two drachms

of gentian (pulv. gentianæ), and half-a-drachm of ginger, mixed with gruel and half-a-pint of good ale, may be given twice or thrice a day. The curative process of the ulcers will be promoted by dressings of tincture of aloes. The seton, however, should be continued for two or three weeks.

It is easier to prevent the attack of this formidable disease than to cure it. Cattle, and young cattle especially, should not be suddenly put into rich pastures; they should be previously purged, and introduced by degrees, being occasionally removed into a bare pasture, where, without gorging to repletion, they may digest at leisure what they have taken. Too much water is dangerous, especially if taken when the animal is from any cause overheated. Putrescent ponds, turf-pits, and the like, are to be avoided, as the water is noxious even if taken in moderation. Young growing cattle should not be too highly fed. There is no occasion to starve them; but there is a medium which good sense will dictate. The stock, moreover, should be daily inspected; and should any suspicious symptoms appear,—any shivering, any heaving of the flanks, any difficulty of respiration, any dulness or redness of the eyes,—a purgative, and the loss of a little blood, may stop the approaching mischief.

TYPHUS FEVER.

Inflammatory fever in cattle of all ages, but more particularly in adult beasts, sometimes assumes a low, lingering, typhoid form. The gait is staggering, the appetite is gone; diarrhœa succeeds moderate doses of medicine, or comes on spontaneously. Tumours appear on the limbs, back, udder, &c., and ulcerate, and the breath is fetid. This disease is most prevalent in the spring and autumn; especially on marshy lands, subject to miasmatous exhalations. It is sometimes epidemic, and fatal to a great extent, sweeping away numbers of valuable cattle. Occasionally it is accompanied by a catarrh, but mostly by diarrhœa or dysentery, the indication of inflammation or congestion of the mucous membrane of the intestines. The same decided treatment which we have described in inflammatory fever, must be adopted: the lancet must be used boldly. The purgative of salts, &c., should be given, and its action kept up by six or eight ounce doses of sulphur. If the dysentery be violent, calomel and opium will be found useful, in doses of thirty or forty grains of the former, and a drachm of the latter, mixed in thick

gruel: emollient injections should be administered, and castor oil given in doses of a pint. The irritation of the intestines must be allayed, and their healthy and vigorous action induced. A seton of hellebore should be inserted in the dewlap; and the general treatment be conducted as we have detailed in inflammatory fever.

CATARRH, OR HOOSE; EPIDEMIC CATARRH, OR INFLUENZA; AND MALIGNANT CATARRH, OR MURRAIN.

Catarrh, or hoose, consists in inflammation of the lining membrane of the great nasal cavities, spreading to the fauces, the glands of the throat, and the larynx and windpipe. It is mostly, perhaps, in the spring and autumn that catarrh prevails; it is caused by sudden changes of temperature; as, for example, a change from a close, overheated, and crowded cowhouse to a bleak unsheltered pasture, during cold rain or stormy easterly wind. Cattle heated by being overdriven, and exposed to a cold current of air, are apt to be affected by it.

This disease commences by febrile symptoms: the pulse is quick and hard; the roots of the horns are hot; the ears and head are drooping; the animal is dull, repeatedly coughs, and neglects to feed. In a short time a discharge from the nostrils takes place; the animal swallows with difficulty, and exhibits great debility. If neglected, the disease insidiously pursues its course, atrophy ensues, the lungs become affected, and consumption supervenes. However slight catarrh may appear at first, it should not be, as it too often is, regarded with indifference. The cow has a discharge from the nose, her milk decreases, she coughs, her flanks heave, she loses flesh; and perhaps, when it is too late, the farmer takes the alarm, and sends for the veterinarian.

The treatment of this disease, if taken in time, is simple. Blood must be abstracted (the animal having been placed under shelter and apart), and this must be followed by saline aperients, salts and ginger, in whey or gruel; after which doses of nitre (nitrate of potass) may be given two or three times a day in gruel. The dose may be from two to four drachms. Nitre will allay inflammation, and act upon the kidneys. Gruel, warm bran mashes, with a little grass or good hay, constitute the best diet. If the difficulty in swallowing is considerable, a seton in the dewlap should not be omitted; or the throat may be blistered (though not readily)

by rubbing the skin with the common blister ointment, or a liniment consisting of an ounce of the powdered blisterfly, two ounces of oil of turpentine, and six ounces of common oil.

Catarrh is sometimes epidemic, spreading over whole districts, and assuming a very virulent and dangerous form. At the commencement the fever is very severe, the respiratory passages are greatly inflamed, there is a distressing hoose, and the aspect is agitated. Sometimes the bowels are confined; but sometimes diarrhœa comes on, and is very troublesome. If not checked, a stage of debility supervenes, the fever assumes a typhoid form, crackling air-filled tumours in the cellular tissue show themselves about the head, loins, and limbs; the breath becomes fetid, the animal staggers, its coat is staring, its flesh wastes away, the discharge from the nostrils is sanious, and death ends the scene.

During the febrile stage, bleeding freely and promptly, with a repetition of the bleeding if necessary, together with active aperients and sedatives (digitalis, tartarized antimony, and nitre), as recommended in inflammatory fever, warm mashes, and injections, must be resorted to. But in the stage of debility little can be done. Doses of nitrous ether (two or three drachms) and laudanum (half-an-ounce), mixed in gruel, may perhaps be serviceable. Should the fever pass off, and simple weakness only remain, tonics, such as gentian and ginger may be given.

Catarrh sometimes appears in the form of a malignant epidemic, sweeping away the cattle of whole districts, and, in fact, spreading over whole countries.

INFLAMMATION OF THE LARYNX AND WINDPIPE.

Besides the catarrhal affections described, cattle are subject to inflammation of the lining membrane of the larynx and windpipe, often extending through the bronchial tubes. This is a formidable disease, sometimes apparently epidemic, but more frequently the result of sudden atmospheric changes in cold damp situations. The disease commences with the usual symptoms of fever, shivering, loss of appetite, a quickened pulse, and a laboured, husky, wheezing respiration, to which succeeds great debility. The least pressure along the throat evidently gives great pain, the animal moves its head stiffly and with difficulty, and cannot swallow without a marked effort the drinks administered.

On examination after death, the lining membrane of the larynx and bronchiæ show the result of violent inflammation in ulcerated patches and gangrene, the gullet being also more or less involved in the disease. The windpipe is generally filled with purulent matter; and if the disease has extended to the bronchial tubes, the same appearances are there also presented; but these tubes are often choked up with parasitic worms of the genus *filaria*, and they appear also in the windpipe. In bronchitis of the horse, a species of the worm *strongylus equinus* in like manner is found to throng the bronchial tubes. It is not easy to account for the presence of these worms, unless we suppose their minute eggs to be taken in with the air or food, and pass through the lacteals into the blood, which carries them through the circulation, till at length they find a nidus appropriate for their development; but there is still this difficulty,—Whence came the eggs into the air or among the food? The worms, as it would appear, are exclusively the inmates of living creatures: how do they spread? how do they extend their colonies? This is not the place for speculation. In laryngitis, that is, inflammation of the larynx not extending down the windpipe, recourse must be had very promptly to bleeding, smart aperients, blisters, and a seton of hellebore. If the disease runs on, suffocation ensues; but, should this catastrophe threaten, tracheotomy must be performed: that is, the trachea must be opened, and respiration carried on through a tube or canula. No one but an experienced veterinary surgeon can perform the operation, or should attempt it. If the disease extend to the trachea or windpipe, the same treatment is necessary.

In bronchitis, or inflammation of the branches of the windpipe which ramify through the lungs, the symptoms are a cough, which becomes more and more husky and wheezing; a rapid and laborious breathing; the flanks heaving; the belly tucked up; the hide staring; the skin hide-bound; an anxious, restless expression; a disinclination to move; an increase of the painful cough, and a hurriedness of respiration, on taking a few steps. The animal wastes away, and dies a skeleton, often by suffocation; the air tubes being blocked up by the thickening of the lining membrane, by mucus, and by worms.

To this disease young cattle are peculiarly subject; and we need not say that it is one of a most destructive nature. The great object at the commencement of the attack is to subdue

the inflammation by bleeding, active aperients, and sedatives; if these means prove unsuccessful there is little hope. When the tubes are thickened, clogged with mucus and worms, what can be done? Could the irritating parasites be removed there would be a chance of recovery. Spirit of turpentine promises at least occasional success. In calves labouring under hoose and the irritation of bronchial worms, spirit of turpentine has been found efficacious, and might be in older cattle. Mr. Dickens recommends in cases of hoose or cough in calves, the bronchial tubes of which are filled with minute worms, the following draught, repeated at intervals of a week or ten days:—

Linseed oil, 1 oz.
Oil of turpentine, 4 oz.
Oil of caraways, 20 drops.
Mix.

A contributor to the *Veterinary Journal* has found the following mixture very successful, viz:—

Spirit of turpentine, 6 oz.
Tincture of opium, 1 oz.
Balsam of sulphur, 1 oz.
Gentian, Ginger, } of each 1 drachm.

The dose of spirit of turpentine for grown-up cattle may extend from two to four ounces, with as much linseed oil, a few drops of caraway, and a little gruel.

The *rationale* is as follows: the turpentine, so peculiarly destructive to worms, is taken up into the system, enters into every part of the circulation, and is recognizable both in the urine and breath. It is thus brought into contact with the worms, whom it immediately destroys; their hold being loosened, they are then easily expelled from the larynx by the cough, and the bad symptoms will gradually abate. The dose may be repeated every other day, or twice in the week.

INFLAMMATION OF THE LUNGS, OR PNEUMONIA.

With the bronchial disease, previously described, there is generally an attendant inflammation or congestion of the lungs (that is, of their cellular substance) to a greater or less extent; but sometimes pneumonia manifests itself independently and in an acute form. It is generally the result of over-driving cattle

when in an unfit state from fat to travel hard or work long. The disease commonly makes its appearance within a day or two from the exciting cause of it, and is characterized by dulness, a frequent cough, a drooping of the head, and a heaving of the flanks, to which the animal often turns its head; the horns, ears, and legs are cold, the pulse is small and quick, but sometimes not quicker than usual. Respiration is evidently painful; this, the frequent act of turning the head to the sides expressively indicates; but the cough is not so frequent as in bronchitis. Frequently the animal grinds the teeth, and utters short groans. The cattle generally stand, sometimes lie down, and this is always the case with calves. The smallness of the pulse, arising from congestion of the cellular tissue of the lungs, should not deter us from bleeding, nor from cautiously repeating the abstraction of blood if necessary. In the horse, when labouring under inflammation of the lungs, aperient medicines are dangerous; but in horned cattle this is not the case, and brisk medicines may be administered with advantage, assisted by injections. The sides should be blistered or fired by the cautery, and setons of hellebore inserted into the dewlap. Bran mashes and gruel may be given, and the animal on recovering must be kept low, and only allowed by degrees to return to its ordinary diet. Acute pneumonia sometimes appears as an epidemic, and rapidly passes through its stages, mostly ending fatally. In this disease the symptoms of ordinary pneumonia are all aggravated. The muzzle is dry, the mouth is hot, the flanks heave, there is excessive thirst, the coat is rough, the hind limbs are feeble, and the alvine excretions are either hard and black, or liquid, dark, and fetid; soon the spine exhibits signs of tenderness, especially over the lumbar region; there is harsh grinding of the teeth, moaning, violent heaving of the flanks, and a convulsive cough; the eyes are wild, the expression is agitated, the nostrils open and close as if with a spasmodic effort; sometimes tumours appear on the skin, and occasional shivering is succeeded by violent sweating; alternately the back becomes arched, the belly contracted, the pupils of the eyes dilate, stupor comes on, and the beast falls and dies. After death the lungs are found on examination to be gorged with black blood, often offensive and putrescent; in some parts they appear hepatized or solidified like liver; sometimes tubercles filled with purulent matter are present; the pleura, or investing membrane of the lungs, is thickened; and the heart and

diaphragm exhibit the ravages of inflammatory action. Generally the fourth stomach is inflamed, and the maniplus filled with hardened material. From the horribly putrescent state of the gorged blood in the lungs, this disease has been called gangrenous inflammation of those organs, but the term is incorrect. This disease, at various times, has appeared in different parts of the continent, in Germany, France, Denmark, &c.; in England it is also known, and is often the cause of great mortality. It is only at the commencement of this fearful malady that there is much chance of doing good. A free use of the lancet is imperative; bleeding must be pushed to its utmost extent, and smart aperients with injections must succeed; these having acted, sedatives, as nitre, digitalis and emetic tartar combined, may be given at regular intervals. Some veterinary surgeons recommend as a purgative two scruples of the powder of croton seeds, to be followed up by salts and the injection pump. (No farmer should be without the enema-pump of Read's invention, or at least a simple apparatus, always at hand.) Setons in the dewlap, and firing the sides, or blisters, should not be omitted. Should the inflammatory symptoms yield, care and a cautious diet will be all that is ordinarily needed, unless the debility be such as to render tonic draughts advisable.

The following observations by Mr. Lord, in the *Veterinarian*, for July, 1841, are very interesting: "In the latter end of last April," he writes, "the Earl of Kingston sent for me, and told me that his cows were dying very fast from some disease that had been in his farms for the last year, and which his steward believed to be incurable. After a minute examination I found the symptoms as follows:—pulse in almost all that were affected from 93 to 120, but very small; horns, ears, and legs cold; the animals heaving violently at the flank, and grunting as if in great pain, also grinding the teeth. With the stethoscope I could discern the bronchial respiration in some, and the mucous *râle* in others.

"*Treatment.*—In the early stage I bled largely, notwithstanding that the pulse was small, as I consider this arises from pulmonary congestion, which bleeding removes. I next fired and blistered the sides, and gave *white hellebore* half-a-drachm, morning and night, as long as they could bear it, and changing it then for tartarized antimony and nitre, keeping the bowels open by occasional laxatures. With this treatment I cured four out of five of the beasts which the steward

and attendants considered as sure to die, and I have more recovering."

PLEURITIS, OR INFLAMMATION OF THE INVESTING MEMBRANE OF THE LUNGS AND THE LINING MEMBRANE OF THE CAVITY OF THE CHEST.

Although in acute pneumonia the pleura covering the cellular mass of the lungs is generally involved in the inflammation, yet inflammation confined to the pleura itself is not of uncommon occurrence. Many causes conduce to this affection: exposure to keen draughts of wind, a wet couch, overexertion, blows on the side, lying all night on the frozen ground unsheltered from the weather,—these and the like may induce the disease.

In pleuritis the shivering fits come on with great frequency and violence, during which the shoulders quiver; and this latter symptom occurs even when there is no general shivering. The breathing is quick, short, and abrupt, like rapid panting; there is a short but painful cough, there are twitchings and a wavy motion of the skin of the sides, and the animal shrinks as if from pain when the latter are pressed. The flanks are tucked up, and the expression of the countenance is distressed; if the disease go on, it usually terminates in the effusion of serum, not unmixed with coagulated lymph in the chest (in fact a dropsy of the chest), which oppresses the lungs, prevents their action, and destroys life. In pneumonia we observed that the lungs were gorged with black putrescent blood; in this disease they are smothered in water, which fills the cavity inclosing them. The treatment of pleuritis is, however, the same as pneumonia. The lancet is the anchor-sheet of hope, assisted by aperients, blisters, setons, and low diet.

Occasionally pleuritis changes its acute for a chronic form, and the animal lingers on, becoming emaciated and weak, with a dry cough, tenderness of the sides and loins, and difficulty of respiration, as in asthma, accompanied by a short groan and a drawing down of the angles of the lips, with a heaving of the sides. The animal at length dies, wasted away to a mere skeleton. On examination, the lungs are found more or less extensively adherent to the sides of the chest, bound by firm bands, the result of inflammation; there is generally fluid, also, in the chest, and in the pericardium. Where the pleura of the chest and lungs do not adhere, the

membrane is thickened, and has its texture changed. In these cases there is no hope of cure. An animal, indeed, may live and enjoy life, when, after acute pleuritis, adhesions exist between the lungs and chest; but then all inflammatory action is subdued. On the contrary, in these cases it goes on like a smouldering fire, sometimes apparently extinguished, but again returning; new adhesions succeeding to those previously formed, till the lungs can no longer perform their functions.

In animals which have died from pleuritis, we have often observed the pleura of the chest appear as if very minutely granulated. We remember once, in the human subject, seeing the pleura studded with calcareous patches of some thickness; and a similar deposit sometimes occurs in cattle.

CONSUMPTION, OR PHTHISIS.

Neglected catarrh, or inflammation of the lungs, often produces tubercles in the lungs, which, increasing in size and running together, at length suppurate, forming abscesses in the substance of those organs. The progress of consumption is insidious: in the human being life continues even when a great portion of some of the lobes of the lungs is wasted away by ulceration. The hollow, distressing cough, the hectic flush, the overbright eye, the expectoration of purulent matter, often mixed with blood, foretel the result; but if a sufficient quantity of the lungs is left for respiration, unless some larger blood-vessel or tubercle burst and produce sudden suffocation, the patient lingers on.

In the ox the same thing occurs. We have seen extensive tubercles in the lungs of oxen killed in good condition for the market; and the fact has often surprised us: but on considering that the progress of the tubercles is at first slow, that they do not for a long time interfere with the functional duties of the lungs, that the animal reposes at ease in a stall or yard, fattening, notwithstanding the tuberculous affection of the lungs; so that, most probably, the rapid increase of the disease resulted from the long journey to London, during which respiration was necessarily hurried, and a larger quantity of blood sent through the lungs, while time was not allowed before the butcher's stroke for the wasting of the body;—on considering these points our surprise diminished.

We have said that neglected catarrh, or inflammation of the lungs, often produces phthisis; and such is the fact: but

we suspect that there must be in such cases a predisposition to this scrofulous affection. Often, indeed, phthisis manifests itself without any previous definite symptoms. Minute tubercles have existed dormant in the lungs, perhaps for years, nay, perhaps even from birth; but some exciting cause not to be clearly appreciated or detected,—a trifling cold, a hurried walk, a sudden chill after perspiration, damp garments, or some trifling neglect, is followed by dull pain in the chest, a hollow peculiar cough, uneasiness in lying on one side or the other, and other symptoms, which go on for months, or years, till some additional cause accelerates the progress of the disorganization, when copious purulent expectorations, hectic night sweats, debility, severe diarrhœa, and emaciation, end in death. If these observations apply directly to our fellow-creatures, so they do to the dumb brute. During the progress of consumption in the human subject, the appetite is often undiminished, though digestion is slow and difficult; and the mind is not only clear, but roused to intense activity. In the ox, the appetite seldom fails much,—the animal is lively; nay, in cows, the sexual desires seem not only unabated but increased; but the animal is subject to abortion. During pregnancy the symptoms of consumption are generally much mitigated; the great current of blood is directed elsewhere for an especial object; but, after delivery, the disease goes on with accelerated rapidity. In cattle, besides the hollow cough, there are purulent and sometimes bloody discharges from the mouth and nostrils, and irrepressible diarrhœa; the skin is evidently very painful when pressed; the cellular tissue beneath is either inflamed or becoming disorganized; the surface of the skin is dry and scaly, and some writers affirm that it will even creak as the animal moves feebly along.

When phthisis is fairly confirmed, medical treatment is of no avail; but, in the incipient stage, blisters, sedatives, and cautious bleeding, with a seton on the side, or in the dewlap, may arrest for some time its further progress. The animal, moreover, should be housed in a comfortable and well-ventilated stable, apart from other cattle, and not exposed to the north or easterly winds; it should never be hurried or alarmed; the litter should be always kept dry, and the skin often currycombed, in order to excite the action of the cutaneous vessels.

With respect to the use of iodine in incipient phthisis,

some practitioners speak very highly. Mr. Youatt says, that though he will not affirm that he has discovered a specific for consumption in cattle, yet he has saved some that would otherwise have perished. He would urge on practitioners the study of the symptoms of phthisis, and attention to the inward, feeble, painful, hoarse, gurgling cough, of consumption; and as soon as they are assured that this termination of catarrh, or pneumonia, or pleurisy, begins—that tubercles have formed, and have, perhaps, begun to suppurate—let them have recourse to the iodine in the form of the iodide of potass, given in a small mash in doses of three grains, morning and evening, at the commencement of the disorder, and gradually increased to six or eight grains. To this should be added proper attention to comfort, yet not too much nursing, and free access to succulent, not stimulating food. The medicine should be continued not only until the general condition of the beast begins to improve, but until the character of the cough has been essentially changed.

INFLAMMATION OF THE HEART AND PERICARDIUM.

In the horse, an animal called to violent and continued muscular exertion, to the toils of the chase and the course, inflammation of the heart is by no means of uncommon occurence; but in the ox it rarely occurs as a disease *per se*. The symptoms cannot be mistaken: the pulse is full and very strong, and the heart may be seen and felt violently pulsating against the left side of the chest; and each stroke may be heard, even at a distance.

Copious bleeding through a large orifice, even to fainting, and repeated if the symptoms are not decidedly suppressed, with smart aperients, are the only means on which any dependence is to be placed.

Inflammation of the pericardium, or sac enveloping the heart, occurs occasionally from extraneous causes. Cattle have sometimes a strange propensity to swallow sharp-pointed substances, as pieces of wire, large needles, nails, &c.; and these articles, which, when accidentally taken into the stomach of other animals, work their way out externally, generally without much injury, take in cattle a more dangerous course.

In cattle such substances often, perhaps mostly, work their way into the pericardium, producing inflammation, and other extensive ulceration or dropsy of the chest. Several cases of

this kind are on record, in which pieces of wire, large pins, and needles, have been discovered, after death, sticking in the pericardium. The symptoms in these cases are obscure, till effusion in the chest is detected by the ear or the use of the stethoscope. We need not say that no directions for medical treatment in such cases can be given.

INFLAMMATION OF THE LIVER, OR HEPATITIS.

Acute inflammation of the liver does not appear to be a very common disease in cattle, and occurs mostly in such as are stall-fed on high diet, and debarred from due exercise. The symptoms of this disease are not always very determinate. There is generally a yellowness of the eyes and skin, indicative of a cessation of action in the liver, which no longer separates the bile from the blood. Considerable fever exists, indicated by dryness of the muzzle, heat of the mouth, and a quickened pulse; the abdomen, especially on the right side, is tumid, and pressure gives decided pain; the animal often turns its head round, and endeavours to lean the muzzle against it. The bowels are generally constipated; but this condition often alternates with violent purging. Mr. Brown, in the *Veterinarian*, remarks, that a diminution in the milk of the milch cow is one of the first symptoms, and that the cream drawn from it presents a ropy appearance, and has a saltish taste. As the disease progresses the aspect of the animal becomes dull and depressed, and the appetite impaired; the animal loses its ordinary activity, its gait is stiffened or staggering, with a halt on one or more of the limbs. The eyes are dull, and the transparent cornea sometimes become opaque; the nose is alternately dry and moist; the mucous membranes, the nasal secretions, and the skin, are yellow.

In protracted cases, when the animal begins to recover, "a yellow scurf rises from the skin, which gives the hair the appearance of being dusted with turmeric." Rumination is either wholly or partially suspended, the secretion of milk is limited, and inflammation usually appears in one or more quarters of the udder. Tumours not unfrequently appear in different parts of the body, and, on bursting, discharge a fetid matter.

In some cases the respiration is at first frequent, and accompanied with a short painful cough; but in most instances it is not much disturbed. The bowels are generally obsti-

nately constipated, with occasional intermissions of diarrhœa; but some cases occur in which the animal is attacked by violent purging, the alvine excretions being copious, dark, and fetid. During the progress of the disease the pulse varies considerably in its character, but is usually feeble.

The treatment recommended is moderate bleeding in the early stages of the disease, which it may be often necessary to repeat; after this one drachm of calomel, suspended in thick gruel, with half a drachm of opium, and two drachms of ginger, may be given. In the course of six or eight hours after this, an aperient, composed of eight ounces of Epsom salts, four ounces of sulphur, and half-a-pint of linseed oil, with gruel, may be administered, and repeated in twelve or eighteen hours if the prior dose has taken no effect. "In severe cases a blister may be applied to the right side, and a drachm of calomel, half-a-drachm of opium, two drachms of gentian, one of ginger, and two of nitre, administered in gruel twice a day."

In cases where diarrhœa occurs from the commencement, the aperient dose should be either entirely omitted or given in only half the quantity: but the calomel and opium, &c., repeated morning and evening. In all cases the diet should be restricted and simple, and as little stimulating as possible.

Active inflammation of the liver may yield to a certain extent, and ultimately merge into a chronic form; the liver now becomes preternaturally enlarged and indurated, sometimes soft and spongy; it is often studded with tubercles of large size filled with purulent matter. It is the nidus of numerous hydatids; and fluke-worms (distoma hepaticum) inhabit cysts in its substance and even the biliary ducts.

Chronic inflammation, however, is not necessarily the result of active inflammation; it occurs when no such inflammation has previously existed, and it may continue for a considerable period without any decided symptoms being manifest. We have frequently seen decided indications of chronic disease of the liver in animals slaughtered for sale, and which were in good condition. This disease may run on to a horrible extent before it destroys life, though the animal may be meagre, weak, dull, and hide-bound.

JAUNDICE, OR YELLOWS.

Jaundice, to a greater or less extent, is the accompaniment of chronic inflammation of the liver; it arises from the ob

truction to the passage of the bile through the ducts, either rom alteration of the intimate structure of the liver, or from he pressure of tubercles or tumours

There is, however, another and very common cause of jaundice, which in noticing the morbid affections of the liver we cannot here omit to describe; we allude to the obstruction of the biliary ducts by gall-stones. It is astonishing how often gall-stones are found in the gall-bladders of cattle: they vary in size from a pin's head to a walnut, and as long as they cause no obstruction, they neither inconvenience the animals nor interfere with health. But sometimes, nay very often, they enter the duct which conveys the bile to the intestines (the cystic duct) from the gall-bladder, which unites with a larger common duct from the liver itself, before entering the duodenum. When a gall-stone enters the cystic duct, it soon becomes impacted; it stops the current of the bile; spasmodic action of the muscular fibres of the duct, occasioned by the irritation, and accompanied by violent agony, succeeds; the skin and eyes become suffused with bile; generally in due time (longer or shorter according to the size of the stone or calculus) the duct is dilated, and the obstructing object passes into the larger common duct, along which, not however without causing some obstruction, it proceeds till it comes to its entrance into the intestine (duodenum). Here again it meets with a fresh difficulty; this entrance is surrounded by muscular fibres, which act as a sort of valve, or rather as a constriction, yielding freely to the pure bile, but contracting on the irritation of a preternatural object. Before this barrier is forced, spasmodic agony again takes place; at length the muscular fibres yield, and the gall-stone passes into the intestine; the pain ceases, but it is some time before the jaundice of the skin disappears. Unfortunately, when this occurrence has once taken place, it opens the way for repetitions of the whole affair, and calculi sometimes lodge in the ducts for a considerable time, producing confirmed jaundice. This state of things cannot exist without producing general derangement of the system; the alimentary canal is immediately affected; loss of appetite, constipation, thirst, a hard quick pulse, a heaving of the flanks from increased and febrile respiration, dulness, and loss of strength and flesh, with yellowness of the skin, of the eyes, and of every secretion, milk, urine, &c., are prominent symptoms. The skin becomes dry, and throws off yellow mangy scurf, and

the hair becomes ragged, and falls off in unsightly patches; then, perhaps, an uncontrollable diarrhœa comes on, under which the poor beast may sink. It can scarcely be possible, with this state of affairs, that the liver will not become more or less inflamed; and thus may gall-stones produce a disease in that organ which did not previously exist. Hence, then, while a jaundiced state of the skin may result from chronic inflammation of the liver, the obstruction of gall-stones in the biliary ducts may not only produce the same yellow suffusion, but even excite inflammation, which perpetuates the jaundice.

It is the opinion of some writers, that the presence of fluke-worms (distoma hepaticum) in the biliary ducts will produce jaundice. We will not say that these parasites may not occasionally produce it, but we can say that of numbers, not a few, of ruminants of every species, which it has been our lot to examine after death, not one was jaundiced when fluke-worms alone were found in the liver or biliary ducts; the same observation applies to hydatids in the substance of the liver. Indeed we have found fluke-worms in the liver of some of the best fed and most healthy-looking sheep that were ever slaughtered by the butcher. It is a fact that the liver of the finest codfish is infested by hundreds of cœlelminthous worms, coiled up in cells or crypts, and which move and crawl for a long time after being extricated from their nidus.

With respect to the treatment of jaundice:—Could we, as in the case of the human patient, be informed as to the character and seat of the agony the animal is undergoing during the passage of gall-stones, we should have recourse to opium, sedatives, hot fomentations, and subsequent aperients; but, as a general rule, the poor animal endures its pain unnoticed, and the jaundiced appearance and evident illness of the beast alone afford us indications of what it may have suffered.

In cases of jaundice, let the region of the liver be well and carefully examined; it is important to determine how far this organ is affected, if possible; under all circumstances (unless the animal be in a state of weakness and emaciation), the abstraction of a small quantity of blood is advisable; and if the animal suffers spasmodic pain, let an opiate (an ounce of laudanum or a drachm of pulv. opii, in gruel) be given; follow this up, after a few hours, by pur-

gatives of Epsom salts, in six-ounce doses, with ginger, aided by copious injections. If there be no spasmodic pain, and the usual symptoms of jaundice only appear, aperients, mashes, and low diet may be successful. Some practitioners recommend aloes, Barbadoes soap, and Venice turpentine; but simple aperients are more safe, and quite as efficacious. Should the liver be swollen and tender, blisters, setons, and perhaps even calomel (though it should never be rashly administered), may be requisite. After all, jaundice is not one of the most tractable of diseases, and when once confirmed will often bid defiance to the efforts of the most skilful veterinarian. All nostrums in this disease (and many there are in vogue among the ignorant), as saffron, &c., are either absolutely inert or injurious.

INFLAMMATION OF THE SPLEEN OR MILT.

The symptoms of this disease are obscure; seldom perhaps is the spleen affected, independently of other organs, as the heart, lungs, and liver. Yet pure inflammation and disorganization of the spleen occasionally occurs; but all our knowledge of this affection is derived from the authority of others. Professor Volpi, clinical lecturer at the Veterinary College, Milan, in a work published in 1813, says, that "cattle are subject to a very acute kind of inflammation of the spleen, which generally destroys them in three or four days; it is not, however, of a contagious nature, for it does not attack any other species of animals, nor can it be attributed to marsh miasmata (the surgeon will remember the affection of the spleen connected with ague in the human patient), because it sometimes happens in very dry situations. We generally subdue this formidable disease by free and repeated bleedings, by giving nitre in a quantity of from two to four ounces a day, to which we may add two ounces of aloes, and six ounces of Glauber salts."

INFLAMMATION OF THE BRAIN, PHRENSY, MAD STAGGERS OR SOUGH (PHRENITIS), AND APOPLEXY

Inflammation of the brain is a common disease in cattle, resulting from plethora, high feeding, over-driving, ill-usage; it occurs most generally in sultry weather, and in animals which have fed upon a stimulating diet. The beast at the commencement of the disease is dull, it hangs down its head and seems oppressed with stupor, the action of the heart is

greatly increased, and the pulse is hard and rapid; the pupils are dilated, and the muzzle hot and dry; gradually wild delirium comes on, the eyes are inflamed, protruded, and fierce; the animal is roused to fury, staggers about, bellowing hideously, and, as if actuated by a sudden impulse, rushes at every living thing which may catch its eye. After madly plunging, and rushing with furious energy, it suddenly falls and lies a while senseless, or perhaps struggling convulsively; in a short time it regains its feet, and again exhibits every symptom of fury; again it falls, and again rises, till at length it sinks comatose and dies.

It is only at the commencement of the disease, even if it were possible, without risk of human life, afterwards to attempt anything, that medical treatment will generally avail.

Bleed from a free orifice, even to fainting; and give a quick purgative consisting of aloes, half an ounce or one ounce, with half a pound of salts, and water; some recommend a scruple or half a drachm of the powder of croton-nut, in water or gruel; setons of hellebore in the dewlap are also advisable. Occasionally cattle have been restored, even when the attack of phrensy has come on; but it is then very difficult to secure a beast; if, however, this be effected, the lancet and active purgatives are the only remedies to be trusted.

Apoplexy is a disease to which cattle are subject, and from the same causes as produce phrenitis; it is, however, far more sudden in its attack. It consists in a violent rush of blood to the brain, which gorges the vessels to the utmost, when the animal falls, struggles perhaps for a short time with great force, and then sinks into a kind of stupor, and dies. Sometimes a vessel ruptures, and effusion of blood on the surface of the brain takes place. In some districts apoplexy is called blood-striking, and the word is not unhappily applied. In these cases, while life continues, the only chance is in bleeding freely from a large orifice; should this in a measure restore the animal to itself, the same measures as in inflammation of the brain must be adopted.

Inflammation of the brain, when the animal becomes furious, is often mistaken for *rabies*, especially if any suspicion exist that a *rabid dog* has been in the neighbourhood, or if a strange dog has been seen about the farm or cow-house. It is not easy to distinguish always between rabies and phrensy. Mr. Youatt says, that a rabid ox will plot mischief, and endeavour to lure his victims within his reach; while the

phrensied ox rushes blindly at everything. In the former the saliva and foam are discharged from the mouth in greater quantity than in the latter.

A beast which has been dragged through an attack of phrenitis, or of apoplexy, is liable to a recurrence of the disease. We recommend as a general rule, that after due preparation by purgatives, mashes, scanty fare, &c., it be fattened for slaughter; or, if this be inconvenient, that as soon as recovered it be disposed of for that purpose.

ENTERITIS, OR INFLAMMATION OF THE PERITONEUM OR LINING MEMBRANE OF THE ABDOMEN AND INVESTING MEMBRANE OF THE INTESTINES.

Enteritis, or inflammation of the bowels, as it is commonly called, generally attacks cattle of middle age and robust health, and may result from sudden exposure to cold, or to drinking cold water when overheated, to impure water, to mildewed food, or to a diet generally too stimulating. Occasionally it prevails in certain districts, as if epidemic, occasioned probably by some acrid or unwholesome plants, abundant in the localities on which cattle feed; the disease appears to be most prevalent in hot summers.

Enteritis comes on suddenly: the first symptoms are shivering, dulness, loss of appetite, dryness of the muzzle, a rapid but small pulse; the hair is rough, the loins tender, the abdomen swelled on the left side, and incapable of enduring pressure; the bowels are confined, the animal moans, and often turns its head to the side. If the disease be not now checked, the hind limbs tremble and show signs of deplorable weakness, the animal staggers if it attempt to move, its flanks heave, the head is stretched out, the eyes are red and betray great anxiety, the moans indicative of intense suffering increase in frequency, and the rapidity of the small pulse is further accelerated. The bowels continue obstinately confined; the fæces are hard and glazed with slime, but occasionally liquid fæces are forced with dreadful agony through the indurated mass obstructing the lower bowels; the mouth foams; the animal grinds its teeth; the abdomen is tucked up, though the swelling of the left side is still prominent; the urine is thick, turbid, and exhales an offensive, penetrating odour. The animal now sinks, consciousness begins to fail, it rises up again with a convulsive effort, but again sinks down; the head is rolled about or

raised only to come heavily to the ground, till the scene terminates either in convulsions or in a state of torpor.

Dissection after death shows, very often, an extent and violence of inflammation which are truly astonishing. Not only are the subcutaneous muscles of the abdomen in a state of congestion, but even putrescent; and the subcutaneous vessels of the cellular tissue are gorged with black blood. The abdomen is filled with a bloody effusion; the peritoneum is more or less universally inflamed, and black gangrenous patches appear in various parts of the intestines; the lining or mucous membrane of the intestines is also inflamed and ulcerated; the liver is enlarged and softened; the lungs are in a state of congestion, and there is effusion both in the chest and pericardium. The fourth stomach is highly inflamed, and dry hard layers of food are found in the maniplus, while the paunch is generally found distended with dry vegetable matters. We do not say that all these morbid appearances present themselves together; but ulceration, abdominal effusion, and congestion of the lungs, are almost always present.

When enteritis, or inflammation of the bowels, and especially the small intestines, is accompanied by severe inflammation of the mucous lining of the fourth stomach or abomasum, the French distinguish the disease by the name of gastro-enteritis. But in gastro-enteritis it is chiefly the mucous membrane of the portion of the intestine succeeding the stomach, viz. the duodenum, which is inflamed.

With respect to the treatment in pure enteritis, that is, inflammation of the peritoneum, it is very clear that prompt and energetic measures alone can be serviceable. Let not the *smallness* of the pulse deter from bleeding; blood should be taken even till symptoms of fainting appear; to this should succeed purgatives, the first a full dose, followed at intervals by smaller doses, till the bowels act freely; these should be assisted by injections. The abdomen should be fomented with hot water, and blistered, and gruel and mashes alone given. Anodynes, that is, preparations of opium, are very useful. Immediately after bleeding an anodyne may be given, half an hour before the aperient medicine; it may simply consist of half an ounce or an ounce of laudanum (tinct. opii), or half a drachm of powdered opium (pulv. opii), in gruel. The aperient may consist of nitre (four drachms), cream of tartar (four drachms), castor oil (six

ounces), carbonate of soda (four drachms), and Glauber or Epsom salts (eight ounces), in gruel. The following is another form of aperient, which may be useful:—Barbadoes aloes (six drachms), common salt (six ounces), ginger (two drachms), water (one quart), tincture of opium (two or three fluid drachms). If this aperient be used, the anodyne draught need not be given; but in severe cases we should prefer relieving the pain as soon as possible. For this purpose we must trust to bleeding and opium, followed up by aperients and injections.

Enteritis must be carefully distinguished from *colic*, whether *flatulent* or *spasmodic;* for though the *latter* may end in inflammation, the pain in the first instance results from another cause. Though colic can scarcely be classed among inflammatory diseases, yet it will be useful to notice it in the present place, in order that its symptoms may be compared immediately with those of enteritis.

COLIC, OR FRET.

We will first notice that variety to which the name of *flatulent colic* is given.

Flatulent colic arises from the distension of the alimentary canal with gas, owing to the fermentation of the food. The abdomen swells; the animal moans with pain; it is extremely restless, continually getting up and lying down, and ever and anon striking at the belly with the hind feet, or with the horns. Gas is expelled at intervals both from the mouth and bowels; perhaps the animal appears for a while relieved, but the pain again commences; often there is a rumbling noise, caused by the passing of the gas from one part of the bowels to another, or by the peristaltic action altering the position of inflated portions. There is no violent shivering succeeded by symptoms of burning fever, though the pain may quicken the pulse; there is no prostration of strength; and during the remission of pain the animal moves freely. The most effectual remedy for this disease consists in the chloride of lime, of which two drachms may be mixed with a quart of warm water, two drachms of powdered ginger, and twenty drops of essence of peppermint. While the aromatics are grateful stimulants to the bowels, the chloride of lime unites with the extricated hydrogen gas, and causes the greater portion of it to disappear. The beast should be walked about, but not violently driven, lest rupture or entanglement of the intes-

tines take place, and the animal be thus lost from want of common prudence.

It will be advisable now to give an aloetic purgative, assisted by injections. This may consist of Barbadoes aloes (six drachms), common salt (six ounces), ginger (three drachms), and tincture of opium (two or three fluid drachms), with a quart of water. Accumulations of *un*-bruised oats will often bring on violent colic, not unlikely to end in inflammation.

Spasmodic colic is distinguished from the former by the absence of any great tumefaction and tension of the abdomen; it does not so much arise from the presence of a large quantity of gas in the bowels, as from acrid food and other irritating substances. The agony is accompanied by evident spasms, which have their intermissions and again return; but little gas is expelled from the alimentary canal; the animal moans, paws the ground, strikes at its side with hoof and horn, and, in its excruciating pain, sometimes even lunges at its attendant. This kind of colic, if it continues, is apt to run into inflammation; and it is a point which must be borne in mind. The first thing to relieve the pain and spasm will be a dose of laudanum (one fluid ounce) with sulphuric ether (half an ounce), in thin warm gruel; should it appear, from the continuance of the pain, that any inflammation has taken place, blood must be immediately abstracted, and, whether or not this be done, aloetic purgatives must be administered, assisted by injections.

Great attention must be paid, on the recovery of the animal, to its diet, as the least irritating cause is apt to bring back all the bad symptoms.

Spasmodic colic, if it continue, is known occasionally to produce an entanglement of the bowels; their wreathing peristaltic action is irregular: they infold each other in their spasmodic disturbance, and sometimes become knotted into loops and intricate folds, among which a portion of the intestine becomes tightly embraced, strangulation of the bowel being thus effected. Inflammation now comes on, and death soon supervenes: there is no remedy. This kind of strangulation or *knot* is mostly caused, when it occurs, by brutal and improper treatment: the animal in its agony is relentlessly driven about, perhaps by a dog, the owner ignorantly supposing that such violent exercise is serviceable; the hurried irregularity of the peristaltic action is thereby increased, the spasmodic constriction of the muscular fibres

of the bowels is more vehement, they intertwine each other, the fatal noose is tightened, perhaps the mesentery is ruptured, and death ensues; and all this might have been prevented.

Another result of continued spasmodic colic is what is termed *introsusceptio*;—that is, one portion of the bowels being perhaps spasmodically contracted, is forced forward by the strong peristaltic action of the intestines, and so runs into the succeeding dilated portion, perhaps to a very considerable extent; often the peristaltic action of the intestines is inverted, and in that case a lower portion of the bowel is forced into the portion preceding it. The latter, as far as we have observed in animals, appears to occur the most commonly. The agony resulting from this introsusception, or infolding and sliding of one portion of intestine into another, must be horrible; the mesentery is generally lacerated; inflammation comes on, and the animal dies. The symptoms indicative of this occurrence are indefinite, and the same observation applies to strangulation. But we may suspect the mischief from the increase of pain and the inutility of medicines. If anything is likely to prove beneficial it must be bleeding, conjoined with opium.

INFLAMMATION OF THE MUCOUS MEMBRANE OF THE FOURTH STOMACH OR ABOMASUM, AND OF THE SMALL INTESTINES (GASTRITIS AND GASTRO-ENTERITIS).

Inflammation of the abomasum (gastritis), or rather of its mucous membrane, is a most serious disease, nor is it of very unfrequent occurrence; generally the inflammation is not limited to the abomasum, but extends through the duodenum. This is the gastro-enteritis of authors. It appears to be brought on in most instances by improper food, by acrid plants, by bad water, by musty hay, and other causes which are not easily ascertained.

The symptoms of this disease (for we need not minutely distinguish between gastritis and gastro-enteritis) are heaviness, loss of appetite, disturbed breathing, fever, a hot dry muzzle and tongue; sometimes diarrhœa, occasionally vomiting; and in milch cows, either a cessation of the milk or an alteration in its quality; it irritates or even inflames the udder, and the milk when drawn off is thin, yellowish, and stringy with threads of coagulum. Its smell is often offensive, and sometimes it has a reddish tinge, as if slightly coloured by blood.

According to M. Gellé, "Among the most constant symptoms of inflammation of the gastro-intestinal mucous membrane is loss of appetite, with the arrest of rumination. If the inflammation be intense, the tongue seems to be contracted, and is evidently straighter and more rounded than is natural; the papillæ which cover it become elevated and injected; the tongue moreover is red towards its point, and also along its edges. In certain intense cases of gastritis, and in some serious affections of the paunch or the abomasum, the duodenum and liver participate in the inflammation, and the tongue is yellow or green. This colouring sometimes extends to all the visible mucous membranes. Vomiting, when there has been primitive or secondary affection of the stomachs, denotes almost always a most intense inflammation, either, as is most commonly the case, continued from the abomasum or pylorus, or also from the gullet itself. Hence it is common in chronic gastro-enteritis and rare in acute. Nevertheless, if one part of the food is vomited and the other passes from the abomasum into the duodenum, it may be presumed that the seat of the inflammation exists principally in the abomasum.

"The diminution and even the cessation of the secretion of milk, constant in cows labouring under gastritis, is only the result of the displacement of the vital action of the secretory organ, in consequence of the violent action which attacks the mucous membrane of the digestive organs." In other words, there is an immediate sympathy between the udder and true digesting stomach or abomasum; and the inflammatory condition of the mucous membrane of the latter produces an immediate effect on the former, both as to the quantity and quality of its secretion.

This disease, like all others of an inflammatory type, varies in intensity. In mild cases a moderate abstraction of blood, with purgatives of Epsom salts and sulphur, with a little olive or castor oil, will prove beneficial, the diet being confined to gruel and mashes. In severer cases, the bleeding must be carried to its full extent, and even repeated, followed by purgatives and doses of opium or laudanum; injections should also be resorted to, and a seton in the dewlap may be useful.

We cannot but remark, that this disease is one which the professed veterinary surgeon alone can understand, and which he alone can treat. When the farmer, then, sees his

cow feverish, uneasy, without appetite, perhaps sick, and finds the milk changed from what it ought to be to a disgusting secretion, which, if an honest man, he will not mix with that of healthy cows, let him send for the veterinary surgeon (not the cow-leech), and trust the case into his hands. And here we may state that one object we have in view is to make the farmer and cattle-keeper cautious, and distrustful both of his own opinion and that of the village oracle, half blacksmith half doctor, who is quite as fit to attend the good man on his sick-bed, as he is one of the animals in the yard or cow-house.

Let us now attend to another disease intimately connected with inflammation of the mucous membrane of the alimentary canal: we allude to dysentery, which we cannot well notice without taking diarrhœa also into consideration.

DYSENTERY AND DIARRHŒA.

These two diseases are both characterized by excessive alvine evacuations; and the latter disease, viz. diarrhœa, which is simple purging, may run on into the former. Dysentery we conceive to be always connected with congestion or inflammation of the mucous lining of the intestines, involving disturbance of the functions of the liver and the true digesting stomach. In true dysentery we have fever, tenderness of the loins and abdomen, frequent and perhaps bloody purging, accompanied by tenesmus and spasms, as in colic. Dysentery is often the concomitant of other disorders; but here we speak of dysentery as an acute disease *per se*, occasionally merging into a chronic form, and too often resulting in death.

True dysentery begins with shivering, succeeded by decided febrile symptoms and pain in the bowels, with mucous alvine evacuations, loss of appetite, and nausea; tenesmus and muco-sanguinolent purging succeed, not without pain; the pulse is hard, small, and frequent; the tongue dry; the urine scanty; prostration of the strength rapidly comes on, and the pulse becomes feeble; the tongue is covered with a brown fur; offensive and dark-coloured alvine evacuations now occur; the body is emaciated, the limbs totter, they become spasmodically contracted, torpor and death ensue. Sometimes, after a degree of apparent convalescence, the disease returns and assumes a chronic form; the food, mixed with mucus and blood, passes through the bowels only half digested; the pulse is feeble; there is great emaciation of

the frame, dropsy ensues, and the animal dies worn out. On examination after death the mucous membrane of the bowels, but especially of the large intestines, is found to be inflamed, ulcerated, or gangrenous; in chronic cases the peritoneum participates in the inflammation, and adhesions and effusion of serum are the result. In the first inflammatory attack of dysentery the abstraction of blood is required, and this must be followed by opium and calomel (a drachm of each) in thick gruel, repeated in a day or two if necessary, with mashes in the interval. No green or succulent food must be allowed; and the animal should be well housed and littered. There may be occasion to repeat the opium and calomel three or four times, or even oftener, till the bowels begin to act naturally, when oleaginous aperients may be given.

Diarrhœa or purging may arise from various causes, and may mostly be regarded as an effort of nature to get rid of some irritating matter in the alimentary canal. This cannot be called a disease. But diarrhœa often assumes a very severe and obstinate character, and runs at last into dysentery. It commences with a frequent and abundant evacuation of fœtid matter, owing perhaps to a sudden change from dry to green food, to impure water, or to some particular state of the atmosphere; in a short time the purging becomes more severe, and the evacuations become mucous; the animal suffers severe griping pain, rapidly loses flesh, and at length wastes away to a skeleton. Milch cows and calves are more subject to the disease than oxen. The cow ceases to yield her usual supply of milk; she appears cheerful, eats and drinks; but the diarrhœa or scouring is incessant, and at last she dies. On examination after death the lining membrane of the fourth stomach or abomasum will generally be found much thickened and pallid, with effusion of serum between it and the muscular coat; and these appearances extend to a greater or less degree through the alimentary canal. There is not unfrequently effusion also in the cavity of the abdomen, and that to a considerable extent.

It is evident that in these cases the disease begins in a low inflammation, or state of irritability of the mucous membranes; and all attempts to check its progress by astringents and aromatics will be useless, unless the healthy condition of the mucous membranes be first restored. In the commencement of the disease, as soon as its obstinate character is revealed, the abstraction of a small quantity of blood may be

serviceable, and a dose of chalk, mercury, and opium may be given daily in the following proportions:—Chalk, one ounce; opium, one drachm; calomel, half a drachm; ginger, two drachms. These may be mixed in thick gruel. Some recommend the addition of three or four drachms of catechu; but we fear that powerful astringents may rather produce mischief than benefit. Indeed, if the above prescription acts in restoring the healthy condition of the mucous membrane, it may be necessary to give castor oil occasionally, in doses of a pint, with ten grains of powdered opium. The diet should consist of good sound hay, given in small quantities, and a handful or two of wheat flour may be stirred up in the water. After all, this kind of diarrhœa is not easily subdued, and too often wears down the animal, which dies emaciated and dropsical.

In some diseases, as pneumonia, the occurrence of diarrhœa may be regarded as favourable; but in other diseases, as consumption, it is one of the symptoms of approaching dissolution: it may be moderated perhaps by astringents, as chalk, one ounce; powdered catechu, two drachms; powdered allspice, two drachms; powdered carraway-seeds, half an ounce. Let all these ingredients, except the chalk, be simmered in half a pint of water; then add the finely powdered chalk, mixed in half a pint of ale. To this a small quantity of opium may be added if the purging be accompanied by griping pains.

In simple but acute diarrhœa, before it assumes a dysenteric form, an oleaginous purgative, in order to remove the cause of the irritation of the bowels, may precede the mixture of chalk, opium, calomel, and ginger; this latter medicine may then be repeated twice a day, or only once if the purging be not violent. If given twice a day, half a drachm of the opium will suffice with each dose. Should febrile symptoms make their appearance, indicative of mischief in the mucous lining of the alimentary canal, bleeding may be followed by the chalk, calomel, and opium, as above directed. Injections of starch with laudanum, or gruel, or linseed tea (infusion of linseed) with laudanum (half an ounce) will be serviceable in acting as emollients and sedatives, and should not be neglected.

INFLAMMATION OF THE KIDNEYS.

The kidneys in the ox are of large size, and, unlike those

of the sheep, lobulated in structure; that is, they consist of numerous distinct lobules united together. These organs are subject to several affections, as red water, gravel, calculus, and also pure inflammation. Acute inflammation of the kidneys may be produced by blows on the loins, by violent muscular exertion, by exposure to cold, and by bad or musty food.

The first symptoms are, a frequent desire to void urine, accompanied by a straining effort, which causes the ejection of small quantities only (strangury), a tenderness and heat on the loins, dulness, loss of appetite and fever. In a few days these symptoms increase, and the urine, instead of being limpid, is tinged with blood; streaks of pure coagulated blood also appear in it. The horns and ears are cold, the muzzle dry, the pulse hard and quick, the breathing accelerated. Severe dysentery or diarrhœa now comes on, with violent straining; the alvine excretions are scanty and fœtid: at length they cease, though the straining continues as severe as before. The animal moans heavily from intense pain; its back becomes bowed as it stands crouching; the difficulty of passing the urine increases, and at length total suppression ensues. The animal trembles, breaks out into sweats, and utters distressing groans; the hind limbs become paralysed, the pulse sinks, and the poor beast falls to rise no more.

After death the inflammation of the kidneys is found to extend to the large intestines, and in cows often to the uterus, and the blood is strongly tainted with urine. The treatment in such cases must be prompt and decided. The first thing to be done is the abstraction of blood, and that in no stinted quantity; the loins must be fomented with hot water for a considerable time, and afterwards covered with a large mustard-poultice, or rubbed with an irritating ointment, composed of one drachm of tartarized antimony and five or six of lard. This will produce pustules and great irritation of the skin: blister-ointment, from the well-known effects of the cantharis on the urinary organs, is inadmissible. Purgatives must be administered, and emollient injections of gruel, or linseed infusion, and laudanum. The food should consist of bran-mashes and gruel. The purgatives to be selected are oleaginous, as castor or linseed oil: they must be persevered in until the bowels are fairly unloaded and their action is natural.

During the inflammatory symptoms no diuretic medicines certainly should be given; they will only stimulate fruitlessly

or injuriously the inflamed kidneys, which will soon begin to act naturally when the inflammation is subdued. In the *Veterinarian* for 1840, however, Mr. Rush recommends the following draught, at first twice and afterwards once a day: —"Oil of juniper, half an ounce; oil of turpentine, one ounce; tincture of opium, one ounce; linseed-tea, a pint." This mixture, he states, proved beneficial in some cases which he treated for several days without any amendment. These draughts appeared to cause an increase of the discharge of blood at first; but afterwards it began to abate, and diminished daily. This medicine may be useful when the discharge of blood continues after the pain and strangury have been subdued; but we should prefer trying laudanum and linseed-tea alone. Some practitioners, under these circumstances, recommend astringents; as two drachms of powdered catechu, three drachms of alum, half a drachm of opium, and two drachms of ginger, which are to be simmered, in half a pint of water, for a few minutes; to this decoction must be added a pint of ale, to form a drench, which may be repeated in a day or two. That this mixture will act as an astringent cannot be doubted: but we question its effects on the kidneys.

BLAIN OR GLOSS-ANTHRAX, INFLAMMATION OF THE TONGUE AND PARTS ADJACENT.

The causes of this disease are very obscure. Some attribute it to the eating of certain acrid plants, as various species of ranunculus, &c., but on doubtful grounds. It sometimes appears as an epidemic; and in its latter stage it has been proved to be contagious. Its attack is generally sudden, and variable as to severity; but the affection not unfrequently runs on to gangrene of the tongue and parts adjacent, accompanied with malignant typhus, and the animal dies a miserable object.

At the commencement of blain the animal exhibits the ordinary febrile symptoms, with dulness and the refusal of food. A discharge of saliva from the mouth now appears and rapidly increases: it is at first limpid, but, as the disease gains ground, it becomes purulent, bloody, and extremely fœtid. The inflammation now extends itself; the head and throat swell, often to an alarming degree; the pharynx, or back of the cavity of the mouth, partakes of this congestion and intumescence, to the obstruction of breathing; and some-

times this is carried to such an extent that suffocation is the result. In cases where this event does not take place, large ulcers break out around the tongue and beneath it, and gangrene spreads its destructive ravages; a state of low typhus accompanies this disorganization, and the animal perishes.

If the mouth of a beast labouring under this disease be examined, the tongue will appear to be singularly elevated and swollen; underneath it and around its sides appear numerous large vesicles or bladders, varying in colour from red to a dark livid hue. Sometimes these vesicles appear even on the upper part of the tongue: they burst and form deep ulcerations; and as they burst, others appear in their turn, till, at last, the tongue and parts adjacent are covered with virulent ulcers. The sides of the tongue become gangrenous; incisions into it neither produce pain nor bring blood: the disease has now run its fatal course.

The appearances on dissection, after death, are ulceration and mortification of the tongue, inflammation of the muscular and glandular mass between the branches of the lower jaw, inflammation and ulceration of the pharynx, œsophagus, the paunch, and abomasum, sometimes even accompanied by patches of gangrene. The vegetable matter in the paunch exhales an overwhelming fœtid odour; that in the manyplus is dry and hard; the small intestines exhibit very often traces of high inflammation, and the large intestines as frequently manifest palpable indications of the same morbid action. It often happens that ulcers form about the heels of the foot and between the clefts of the hoofed toes, discharging a fœtid matter.

At different times this disease appears as an epidemic, both in our island and on the Continent, carrying off vast numbers of cattle; though the extent of the mortality has been most probably increased by the inefficacy of the modes of treatment adopted. Mr. Youatt assures us that this disease is contagious: it is not communicated by the breath, but, like glanders in the horse, by actual contact. The beasts must graze in the same field, eat at the same manger, or drink at the same trough; and the saliva of the diseased beast must be received on some abraded, or, at least, a mucous surface. Hence it is requisite that the most stringent precautions be adopted and fully carried out. Instances are on record in which human beings have been inoculated with this malady and died. Mr. Youatt, who observes that many instances re-

lated have perhaps little foundation in truth, gives the following as well authenticated:—"A man held down the tongue of an ox, with a silver spoon, in order to examine the mouth, which had many of the characteristic vesicles. He afterwards, and without any great care about cleaning it, ate some broth with the same spoon. Not many days had elapsed when his mouth felt sore, pustules appeared on the side of the tongue, malignant fever ensued, and he died. When this disease raged at Nismes, in 1731, it was communicated, not only to the human being, but to various species of domesticated animals."

It is requisite, therefore, in attending cattle labouring under the blain, to be careful that the saliva of the animal, discharged from the mouth, touch no sore or abraded part, nor lodge upon the lips. Should such an accident occur, a slight application of the lunar caustic to the spot will prove a sufficient security.

In the early stage this disease may be generally treated successfully; the mouth must be secured, the tongue and parts connected with it examined, and every vesicle freely opened with a lancet, so as to give free vent to the glairy fluid they contain; the mouth and tongue should then be well washed with salt and water, and cleansed as much as possible. If, however, the fluid of the vesicles is at all offensive, as is likely to be the case, if they appear dark or livid, a solution of chloride of lime (two drachms to a quart of water) should be applied very freely and frequently. After this, smart purgatives should be given, and, if the fever be high, blood abstracted. If there be ulcers about the feet, they must be washed with a solution of chloride of lime also, and dressed with tincture of aloes and myrrh, or compound tincture of benzoin (friar's balsam), both to be obtained at the druggist's. In unhealthy sluggish ulcers, a little of the chloride (butyr) of antimony may be cautiously applied.

Should the disease be in a more advanced stage, the free lancing of the vesicles in the mouth is to be thoroughly effected, and the lotion of chloride of lime applied copiously several times a day. Physic must be given; but whether blood should be abstracted or not will now depend on the pulse and the character which the fever assumes. If sloughing of the tongue has taken place, the same plan must be followed out, the solution of the chloride of lime being gradually strengthened; and should the ulcerations or sloughing parts show a healthy surface, they may be washed with tincture of

myrrh. The animal should be supported upon good gruel, poured gently and slowly down the gullet, if the beast refuse to take it; the horn, however, is not often needed. It may be necessary to give tonics also, as gentian and ginger, in doses of two drachms each, mixed with gruel and half a pint of good ale, twice a day.

In this disease many absurd and even disgusting nostrums have been administered, and some unsafe plans put into practice, to the disgrace of those whose common sense ought to have taught them better. That the village blacksmith, or cow-leech, should boast his quack remedies and his pretended skill, is not to be wondered at; but that he should impose upon persons who in all other affairs show discernment, is indeed surprising. Perhaps, however, we do not make sufficient allowance for human credulity, and forget that there is as much pleasure "in being cheated as to cheat."

From experiments which have been made, it would appear that the blain is one of those diseases which seldom occur a second time in the same individual. How far, when the epidemic is spreading abroad, would it be advisable to inoculate for it, and then, watching the result, commence the treatment of the disease, upon its first appearance, when it is easily manageable? We are not aware that any experiment, with this object in view, has ever been made.

THRUSH, OR APHTHÆ OF THE MOUTH.

In many respects this disease bears a close resemblance to blain; it commences with inflammation of the mouth, attendant perhaps upon some disease; and in a short time the sides of the tongue, and inside of the mouth generally, are covered with small pustules which break and ulcerate. There is seldom much fever or loss of appetite; and a few aperient doses, with a lotion of tincture of myrrh, alum, and water for the mouth, will generally prove successful in the course of a week or ten days. Sometimes, however, the ulceration spreads alarmingly, and the symptoms begin to be formidable. If the pulse permit (for great debility then comes on quickly) some blood must be taken away, and the mouth well washed with a solution of chloride of lime, and afterwards with tincture of myrrh. Thrush is generally connected with derangement of the digestive organs, produced by damaged food, foul water, and similar things; but sometimes it appears as an epidemic, especially on the continent, where the

disease assumes a more dangerous form than in our island, the inflammation extending to the throat.

In catarrhal affections vesicles called barbs or paps, of a red colour, sometimes appear in the mouth, but oftener when its membranes are inflamed; these the cow-leech will sometimes ignorantly remove by the scissors or hot iron, producing unpleasant ulcers. In such slight cases a few doses of physic are all that is required; or, should some degree of ulceration take place, an alum wash is sufficient to heal them. These little bladders often appear over the sublingual glands, the orifices of which are enlarged and distended with saliva.

We may here also observe that the submaxillary and parotid glands are, from various causes, subject to acute inflammation and swelling, called *strangullion;* and sometimes abscesses are formed, which become malignant, and are difficult to cure. This is more especially the case with the parotid gland (under the ear). In catarrh, and in epidemic diseases of a severe character, the parotid glands are generally hot, swollen, and painful, rendering the action of the lower jaw very difficult. The swelled gland, moreover, presses upon the adjacent blood-vessels, impeding the current of blood.

Hot fomentations, frequently applied, are useful; and, when suppuration has commenced, it should be encouraged by hot poultices, and the abscess freely opened as soon as the fluctuation of the purulent matter is clearly distinguishable; the abscess will then generally fill up; but if allowed to burst of itself, ulcers, often of a phagedenic character, or apt to become gangrenous, will be the result. For these ulcers washes of chloride of lime must be used, and afterwards dressings of tincture of aloes.

During the inflammatory stage there will be considerable fever, rendering the abstraction of a little blood advisable, with aperients and sedatives; but when ulceration has commenced tonics should be administered. The food should consist of gruel and mashes requiring but little mastication. Contusions, and the blows of cattle-drivers, merciless in the use of their sticks about the heads of the poor beasts subjected to their barbarity, are not unfrequently the cause of inflammation and suppuration of the parotid gland; but the disease very often commences spontaneously, or is sympathetic with general derangement of the system.

ACUTE RHEUMATISM.

Rheumatism is a disease to which horned cattle are peculiarly subject, from exposure to wet and cold, and the vicissitudes of the weather, more especially in the early part of spring. Cows after calving, and beasts in general in a weak state from recent illness, if not shielded from piercing cold, are extremely liable to this affection. It consists of inflammation of the fascia of the muscles, the ligaments of the joints, and the synovial membranes. Sometimes the inflammation extends to the chest, and involves the pericardium. Acute rheumatism commences with fever and loss of appetite; the animal moves stiffly, every action being painful; the spine seems to have lost its elasticity; the loins are tender when pressed; and the animal is unwilling to stir. In this stage it is called by farmers chine-felon, an expression which has no definite meaning. In a short time the joints swell, and cannot be bent without intense agony; they are very hot, and often the veins around them assume a varicose appearance; the disease is now called joint-felon. Ulceration of the cartilages of the joints frequently supervenes; the hind quarters become weak and contracted, or even palsied; the animal is no longer able to stand; and, after lingering for some weeks almost incapable of motion, is relieved from misery by death.

Rheumatism appears in a chronic as well as in an acute form, especially in old cattle which have been worked hard, and exposed to frequent alterations of temperature, or in aged cows subjected to damp or wet. In fine warm weather little appears to indicate the existence of rheumatism, except perhaps that some of the joints of the limbs are swelled: but in bitter weather, when keen east or north-east winds prevail, or when sleet and snow are falling, then the animals droop, and move about stiffly and in pain.

Acute Rheumatism is not easily cured; when it appears to be so it is apt to return; or it may assume a chronic form, and, though subdued for the present, show itself on the first exposure of the beasts to cold or wet.

In the early stages a free abstraction of blood is indicated: active aperients also are required, in which sulphur should constitute an ingredient. After the bowels have been well purged, a dose consisting of nitre, two drachms; tartarized antimony, one drachm; and spirit of nitrous ether, one fluid

ounce, may be given in warm gruel twice a day. To this mixture opium (from half a drachm to one drachm) may be occasionally added. The affected joints must be fomented with hot water or decoction of poppy-heads; and the following embrocation may be used:—Camphorated oil, four ounces; oil of turpentine, two ounces; laudanum, one ounce.

The animal must be comfortably housed, and supplied with gruel. If the swelling of the joints, indicating the excess of synovial fluid, continues after the acute inflammation is subdued, they should be well rubbed, once or twice a day, with an ointment of iodide of potass (one part of the latter, by weight, to seven of lard). This ointment will be found effective in dispersing tumours, enlargements of the glands, and indurations of the udder. Besides being applied externally, three or four grains of iodide of potass (the dose being increased to six or eight grains by degrees) may be given in a small mash, morning and evening.

With respect to the treatment of chronic rheumatism, few explicit directions can be given, excepting that such cattle ought never to be exposed to cold winds or driving sleets. If turned out during the middle of the day, in winter, they should be comfortably housed in the evening.

Tumours of the knees often occur in cattle out at pasture in damp grounds. The swelling occupies the fore part of the knee, and its elasticity indicates the presence of fluid in the tissue immediately beneath the skin. At first there is but little pain: in course of time, however, the tumours increase —inflammation begins; it extends to the joint, which is painful, and soon becomes deprived of the power of motion. These tumours contain a glairy fluid; on being punctured the fluid escapes and the swelling subsides. Stimulating liniments, blisters, and the hot iron, have been used with variable success.

Sometimes hard tumours make their appearance: it is generally to one knee only that this sort of tumour is confined; it does not yield to pressure, is painful, and the animal is lame. Occasionally deep firing has succeeded in removing it, when blisters, and even a seton through it, have had no beneficial effect. In both the kinds of tumours above noticed, which are often connected with neglected rheumatism, though in some cases, perhaps, they are independent of this affection, the iodide of potass, both as an external application, and as an internal medicine, has been found very efficacious.

We have already described the proportions to be used in making the ointment, and the doses to be administered.

We may now pass to the consideration of certain diseases immediately connected with the nervous system, irrespective of acute inflammation of the brain, or of any of the viscera of the chest or the abdomen. We mean those diseases in which the nerves of some part, or the nervous system generally, are immediately disturbed, irritated, or paralysed, and to the affections of which the leading symptoms have direct and express reference. Hence are these diseases called "nervous," —not that there is no disturbance of any other part of the frame; quite the contrary,—but because the nerves bear the brunt, as it were, of the attack.

PALSY, OR PARALYSIS.

This disease, which bears among farmers and cow-leeches the ridiculous names of joint-yellows, tail-rot, tail-ill, or tail-slip, is by no means an unfrequent disease, especially in low marshy situations, and during a cold and changeable spring. Scanty food, bad water, damp, ill-ventilated, and filthy cow-houses, also conduce to it. Overworked cattle turned out into humid pastures, during a cold sleety night, perhaps while sweating profusely, and with no shed to protect them, are very liable to palsy.

Palsy in cattle is generally confined to the hinder quarters, and both sides are alike affected.

Sometimes the attack is sudden, but in most cases it comes on gradually. It begins with debility, and a trembling or failing of the hind limbs; the appetite is now impaired or suspended, and the animal staggers as it walks: soon the hind limbs drag along feebly, and with difficulty perform their office; the pastern joint is bent to the ground, and the animal is supported upon it; the other joints of the limbs give way in turn, and the animal sinks down upon the ground.

It occasionally happens that cows left well, or apparently so, in the pastures, at the close of day, will be found chilled and palsied in the morning; the attack has been sudden, but it may be weeks before the animals are restored, and some perhaps will never recover.

With respect to the treatment of this species of palsy, bleeding will be serviceable in the first instance, followed by warm cordial purgatives, in each dose of which there may be an ounce of ginger, and half a pint of good ale. The bowels

must be kept freely relaxed: this is most essential; the animal should be comfortably housed, and well littered; and a rug or coarse blanket should be thrown over the loins, which latter may be well rubbed occasionally with a stimulating embrocation, as turpentine, olive oil, and hartshorn (or liq. ammoniæ); or blisters may be produced by thoroughly rubbing in the blister ointment.* The food should consist of gruel, with a little hay, and green fodder. In three or four weeks, if all goes on well, recovery will take place.

Nux vomica, or its principle strychnine, have been recommended in these cases; and in France, the former has been given with success, in ounce doses. It is not a medicine to be used rashly, or by any but a veterinary surgeon, in the treatment of cattle.

EPILEPSY.

In many animals, particularly such as are kept in confinement and fed high, epilepsy is a frequent disease; but it is not of common occurrence among horned cattle, and indeed, then, it is chiefly in young cattle that it takes place. Young beasts in high condition, excited by overdriving, or a sultry state of the atmosphere, are the most liable to be seized with it. It arises from a sudden determination of blood to the head: the animal suddenly staggers, reels and falls, the limbs are convulsed, often violently, the flanks heave with astonishing force, the jaws are clenched, the teeth grind, the mouth foams with froth, and the fæces and urine are discharged involuntarily. Sometimes the animal bellows loudly, but this is not always the case. The fit varies greatly in duration; sometimes it is over in half a minute, at other times it may last for many minutes; the convulsions gradually cease, the animal rises staggering and bewildered, it gazes around, and gradually recovering its faculties, commences its repast as before. It is seldom that an animal which has fallen in a fit of epilepsy has not a return of the complaint, perhaps even during the same day, and that more than once. The disease is in fact liable to become habitual, the fits following each other at shorter intervals, till in one of more than usual severity the animal dies. Bleeding, active aperients, and a restricted diet, are the only remedies, with a seton in the dewlap, or on the

* One drachm of tartar emetic, with six of lard, make a powerful irritant, causing a pustular eruption of the skin, when properly rubbed, and is useful in cases where blister ointment is inadmissible.

sides of the neck. If by these measures, actively pushed, no return of the convulsive fits occurs for several weeks, the beast may be cautiously prepared for the butcher.

CHOREA, OR ST. VITUS'S DANCE.

Chorea is a frequent disease in young dogs, and occurs either with the distemper, or after it. That singular affection of the limbs of the horse, called string-halt, appears to be a species of chorea. In horned cattle the disease is not known to occur.

TETANUS, OR LOCKED JAW.

This terrible malady is less common in the ox than in the horse, but when it comes on it is equally unmanageable. It is generally the effect of severe punctured wounds; in working oxen it may be produced by incautious shoeing, one or more nails being rudely driven to the quick. Long and severe travel will produce it, and it often makes considerable ravages among the droves of cattle, during their toilsome and exhausting journeys from the north to the southern markets. Mr. Youatt assures us, that tetanus stands at the head of the list of those diseases which sweep away the greatest number of victims from the herds travelling southwards. Unfortunately tetanus is generally confirmed before its approach even is suspected; nay, it is not then always immediately discovered. The animal stands in the field motionless, with its head stretched out, and the neck rigid. At first perhaps no notice is taken of this, but the animal still continues, having scarcely stirred a yard from the spot, but in the same fixed attitude; its appearance excites alarm, the muscles of the jaw are found to be spasmodically contracted, and the jaw firmly set or locked. What is to be done must be done promptly, for in a short time it will be too late to attempt anything. Blood must be taken in a full stream, till symptoms of fainting manifest themselves, and the animal staggers. This may relax the muscles, and the opportunity must be instantly taken to give a powerful aperient, as half a drachm of the farina of croton-nut in a little gruel; this medicine may be then followed up, if practicable, by full doses of salts, a pound in solution with ginger, and afterwards at due intervals (every six hours) by small doses. These medicines may be assistod by copious and repeated injections, consisting of salts dissolved in five

or six quarts of water. Let the medicines be given slowly and gradually, or they will pass into the paunch, and produce no effect, but by giving them gently and gradually they pass into the fourth stomach. When the bowels begin to act freely, then recourse must be had to that powerful antispasmodic, opium. A drachm or a drachm and a half of the powdered opium, suspended in gum-water, or linseed-tea, may be given twice or three times a day. Still the action of the bowels must be kept up by doses of salts, sulphur, and ginger, and a seton may be introduced into the dewlap. During this time the back, loins, neck, and head, should be covered with sheepskins, or thick rugs, to induce perspiration: and the jaws and neck often rubbed with a stimulating embrocation, as spirit of turpentine, camphorated oil, ammonia, and laudanum. Some persons have recommended the pouring of cold water over the body by means of buckets, the stream being continued for a considerable time; but we doubt the benefit of such treatment.

We have drawn up a favourable case; we have supposed the bleeding to have relaxed the muscles of the jaws, and the purgatives to have operated effectually.

But suppose the most profuse bleeding has not caused the relaxation of the jaws; it has been repeated, but the spasmodic condition of the muscles remains. The case is hopeless.

Suppose the medicines take no effect. In this case we may conjecture very safely that the draughts have passed into the paunch, and remain there inert. The most direct method is to have recourse to the stomach-pump, if it can be applied. The tube must be passed down the gullet, into the paunch, or rumen, and warm water be injected into that compartment till it overflows; the contents will then either be discharged by the action of vomiting, or they will pass through the third and fourth stomachs into the intestines, and the desired purgative effect will ensue. If the contents of the stomach be rejected, the aperient medicines must be again resorted to.

We are quite aware that all these plans are more easily directed than put into practice. The stomach-pump for cattle is not in the possession of every farmer, the fleam is mislaid or lost, there are no medicines to be obtained immediately,—none perhaps are kept on the farm,—and the nearest veterinary surgeon is absent: under these circumstances what is to be done? Bleed, and bleed freely; a sharp

penknife adroitly used will open the jugular vein; let injections and fomentations be in the mean time prepared, and let some one be sent off for the proper medicines, or for the veterinary practitioner, who, understanding the case, will (or ought to) bring them with him. Let us suppose that the beast recovers, the disease and the remedies have given a shock to the system not easily surmounted; nay, a relapse may take place, against which it is hopeless to contend. What is the plan most advisable under all these circumstances? Cautious and gradual preparation for the butcher. The food should be at first suited to the animal's enfeebled frame; gruel and mashes, with a little ale occasionally added; a small quantity of succulent green fodder may be also given from time to time, but nothing requiring laboured mastication; for the very action of the muscles of the jaws is apt to bring on sudden cramps and spasms, indicative of the irritability of the nerves which supply them. By slow degrees the diet may be amended, and the animal at length restored to good condition. After all, it is an expensive and unsatisfactory affair, and at whatever price the farmer may sell the beast, he will not be remunerated.

OBSTRUCTION OF THE GULLET, OR CHOKING.

All roots given to cattle should be first cut into small pieces; carelessness in this point is inexcusable. It is not because roots have been given several times, without being chopped up, and no evil consequences have ensued, that the farmer or his servant may plume themselves on their security. If they neglect this precaution they will most surely rue it some day. One of the cows or oxen, carelessly masticating, will swallow a large portion of turnip or parsnip, or perhaps a whole potato, and it will remain fixed in the gullet; firmly impacted sometimes at its commencement, occasionally lower down, and often within a few inches of the dilatation of the œsophagus, where it joins the rumen. It may be felt externally, and there can be little mistake about the matter. What ensues?—difficulty of respiration; violent husking; spasmodic action of the muscles of deglutition; repeated and violent contractions of the abdominal muscles—all laboured efforts to expel the impacted root: the neck is strangely arched, the nose poked forward; mucus drips from the mouth; and the alvine evacuations are frequent, perhaps involuntary But this is not all; if the animal be not

relieved it becomes hooven; that is, the stomach becomes distended with gas, the diaphragm, and consequently the lungs are oppressed, and the animal is in imminent danger. Something must be done, and done promptly. The farmer knows it: he secures the head of the beast; puts a balling-iron or some rude gag in the mouth, and then forces down the handle of a cart-whip, a stiff piece of cord, or a long stave, in order to drive the obstructing object into the rumen. This rude treatment, it is true, sometimes succeeds; but it often happens that the gullet is frightfully lacerated, and the animal dies in consequence.

Now, in these cases, if the obstructing substance be at the commencement of the gullet, it may often be withdrawn by the hand, the arm being defended by the ordinary balling-iron. But if this is impossible, the obstruction being too low down, a probang must be used. Several very ingenious instruments of this kind have been invented, some with screws in the end to fix into the substance, some with spring forceps to grasp it; a wooden gag being placed in the mouth and there secured, having a perforation of sufficient extent to allow the probang to pass through. These are no doubt admirable instruments in the hands of the practised veterinary surgeon, but we are not so sure that they would prove successful in the hands of the farmer, even if he possessed them. They require nicety and practice in their management.

When a skilful veterinary surgeon is not on the spot with these or similar instruments, a good common probang, which will not lacerate the gullet, may be readily made. A piece of stout cane, between four and five feet long, must be procured, or a long elastic peeled willow wand; this must be armed at the extremity with a piece of sponge, or cork, well secured, and covered tightly with soft leather, so as to form an egg-shaped bulb, with the broad end lowest. Lest this bulb, however well secured, should by any chance slip, let both ends of a piece of strong twine passed through it be wound round the cane, and reach beyond the handle portion. Whalebone may be used instead of cane, but long strips of this are not always to be obtained at the moment. The farmer, or cattle-feeder, however, should always have a probang and an œsophagus-tube in readiness.

In some cases the obstructing substance has been found to be so rigidly impacted, that its removal by any other means than by opening the œsophagus is impossible. This ope-

ration can only be attempted by a good anatomist. Sometimes it is even necessary to puncture the distended rumen in the left flank, for the purpose of letting out the gas, which threatens suffocation.

HOOVE, OR DISTENTION OF THE STOMACH FROM GAS.

When cattle, and especially such as have been kept on scanty fare, are turned into rich pastures, or stray by accident into fields of clover, lucern, or the like, they are apt to eat ravenously, and take in a larger quantity of food than the powers of digestion are capable of managing. The rumen is overloaded; its contents, from the effects of warmth and moisture, begin to ferment, and large volumes of gas are rapidly evolved; the rumen soon becomes awfully distended, even to bursting, for the pillars of the œsophagean canal are closed tightly, and prevent the escape of the gas through the œsophagus; and the more the rumen is distended, the more firmly is this canal closed. The rumen now presses on the diaphragm; respiration and the action of the heart are greatly impeded; the whole body of the animal, especially the left side, is blown up till the very skin seems about to give way; the tongue hangs from the mouth dripping with spume; the eyes are bloodshot and glazy; deep moans attest the torture of the poor beast; it crouches with its back bent up; insensibility comes on; it staggers, it falls, it struggles convulsively, and dies. We have known cows, well at night, found dead in the morning from hoove, having strayed into an enclosure of lucern or clover.

The first object in these cases is to procure the liberation of the gas (at first carburetted hydrogen, but as the disease continues, sulphuretted hydrogen), and this must be done promptly. The œsophagus-tube, with its perforated bulb and stylet, must be introduced through the œsophagus into the rumen, and the stylet withdrawn; a quantity of gas then escapes, the flanks sink, the breathing is more easy, and the animal is relieved. But this tube cannot be kept in the gullet for any great length of time; it must be withdrawn, and in the mean time gas again accumulates. The tube may again be introduced; and afterwards measures must be taken to relieve the stomach effectually. The stomach-pump must be resorted to, and through its tube a quantity of warm water thrown into the rumen, and pumped out again, until the acid fermenting fluid is washed away, and perhaps a considerable

portion also of the coarsely masticated contents besides; after which the process of rumination may go on, especially if the stomach be roused by a pint of warm ale, with a few teaspoonsful of ginger.

Mr. Youatt recommends in these cases, after the first relief is obtained, that chloride of lime, in the proportion of two drachms to two quarts of water, should be thrown into the rumen by means of the stomach-pump, (the horn will not answer, for from the closure of the pillars to the œsophagean canal, the fluid thus administered will pass into the third and fourth stomach.) The *modus operandi* of this medicine is as follows:—Chlorine has a stronger affinity for hydrogen than for lime, potass, or soda; consequently it separates from the lime, and uniting with the hydrogen forms muriatic gas. This gas having a strong affinity for water, is immediately absorbed by the fluid contents of the stomach, and quitting its gaseous for a fluid state is reduced to a very small volume, in the form of a weak muriatic acid, while the lime is disengaged; yet no mischief will arise either from the corrosive acid or the caustic lime, for there is an affinity between these again, so that they combine and form an inert muriate of lime.

This, says Mr. Youatt, is "not mere theory, but when brought to the test of practice is found to be verified in every particular; hence has resulted one of the most important improvements on cattle medicine that modern times have produced." Chloride of lime is, or ought to be, in the possession of every farmer, and always at hand. It may be requisite to repeat this injection into the paunch in the course of a couple of hours, should a fresh evolution of gas take place.

It often happens that urgent cases of hoove occur at a distance from the farm-house, or under circumstances in which neither an œsophagus-tube nor a stomach-pump is accessible, and something must be done immediately. Let the farmer mark the prominence of the left flank, and plunge a sharp-pointed knife into the distended rumen which there presents itself so conspicuously. This will be followed by a rush of gas, steam, fluid, and even portions of food. It is, however, necessary to introduce a tube, for the wound will otherwise close; or, if this be not attainable, the orifice must be kept open by means of a smooth piece of stick, or any other mode that suggests itself at the time, until all the gas is liberated. In this operation the danger does not arise from the wound of the paunch, which is comparatively insensible, but from other

causes—viz. from a puncture of the spleen or kidney, or from the escape of the contents of the stomach into the abdomen, producing peritoneal inflammation. The spleen and kidney may be avoided if the following rule be adhered to: Let a line be drawn close along the spinal column from the haunch bone to the last rib; from the ends of this line let two others of the same length be drawn obliquely down the flank, the whole forming an equilateral triangle; the lower apex of this triangle is the most suitable spot for the incision.

Though sometimes successful, this is a rude operation; as the stomach on the escape of the gas sinks, it too often happens that both fluid and solid matters are discharged through the incision into the cavity of the abdomen, so that, although the animal is relieved for the time, it ultimately sickens and dies. It is, in fact, only strong necessity that can justify the use of the knife; the proper instrument for performing this operation is a trochar, similar to that used by surgeons for tapping the human subject in cases of dropsy. It consists of a steel stylet, terminating in three sharp-edged facets converging to a fine point. It has a stout handle, and is sheathed in a silver canula, or closely fitting tube, from the lower end of which the point of the instrument emerges, while a rim or guard around its base prevents its slipping into the abdomen. When the instrument is plunged in, the steel stylet is withdrawn, and the canula (four inches long) is left in the wound, and secured there as long as may be necessary; it forms a continuous tube from the stomach to the outer surface of the flank, and is long enough to allow of the sinking of the rumen, without danger of the escape of its contents into the abdominal cavity. When all danger is over, the canula may be removed, and the wound closed by firm adhesive plaster. Carminative aperients, as salts, ginger, and caraway powder, may be given in order to clear the bowels, and diminish the chance of inflammation. Mashes may then be allowed, but the animal must be restricted for some time in its food.

In some districts it is the practice, we believe, in cases of hoove, to throw pailfuls of cold water over the animal; the object is to produce sudden shocks, during which the pillars of the œsophagean canal sometimes yield, and allow the gas to escape; occasionally, however, the stomach gives way instead of these muscular pillars, and the beast is lost. Sucking calves occasionally become hooven from some accidental cause; they are apt to suck various objects, even each other's ears.

drawing in and swallowing a great quantity of air; they may be readily relieved by the introduction of a tube or probang.

DISTENTION OF THE RUMEN WITH FOOD.

It is not always easy to discriminate between distention of the rumen with food, and hoove. In both cases the abdomen and flanks are distended, but, in the former, the left flank feels hard and firm, and is less protuberant than in hoove, and these particulars being taken into consideration with the character of the food recently swallowed, will generally lead the farmer or practitioner to form a correct opinion. Nevertheless the probang and tube should be always used, lest there be gas in the stomach, and even if there be none, the instrument will serve to indicate the extent to which the rumen is filled.

This disease generally occurs in stalled cattle fed upon unboiled potatoes, uncrushed oats, and other indigestible materials. It is termed by farmers grain-sick, or maw-bound.

If the stomach be not relieved, inflammation comes on, and the animal dies; and, in severe cases, prompt measures are necessary, for the pressure on the diaphragm, and the consequent oppression of the heart and lungs, are soon followed by insensibility and death.

At all times it is desirable to know the exact nature of the food swallowed, for this may require some modification of the plan of relief to be pursued; indeed, if the rumen be distended with hard heavy materials, as potatoes, an operation may be imperatively demanded.

Should the case be not severe, the animal may be made to move about; and a drench be given, composed of carminatives and aperients, followed by other doses at intervals, till the medicine operates: injections should be also administered, and it may be advisable to take away some blood. After the action of the aperients, the process of rumination may be excited by cordials. In severer cases the animal will not be able to move, and must not be disturbed; indeed the difficulty of respiration forbids any measures but those tending to immediate relief. Supposing that the stomach be distended by light materials, as wheat-chaff, chopped straw, and the like, the contents may be extricated by means of the stomach-pump, a quantity of water being first thrown in, and then immediately pumped out, when some of the matter will be returned with it: this process may be repeated. It may

happen, however, that the tube of the stomach-pump becomes stopped up by the chaff, and the action of the machine impeded. Under such circumstances success has followed the injection of water into the rumen, until it begins to react upon its contents, and discharge them by vomiting. When this ceases, carminative aperients must be given, and repeated till the bowels work freely. The drenches must be aided by clysters. The recovery of an animal in cases of this nature is generally slow; it is long before the stomach regains its tone, and a healthy appetite returns; this should be remembered with reference to the diet, which ought to be restricted, and consist in a great measure of gruel.

In cases when the stomach is gorged to the full with solid heavy food, as undigested potatoes, unaltered grain, and similar materials, which no stomach-pump can remove, or efforts in vomiting throw off, while approaching dissolution threatens, one plan is yet left, viz. a bold operation. A free incision of about five inches long must be made through the left flank into the rumen; a rush of the more fluid contents will immediately take place, and after the stream has subsided the operator must introduce his hand, and carefully remove all the solid masses of food, and empty the paunch completely. Great care, however, must be taken that no food escapes from the paunch into the abdomen, and the wound must be sewed up. This is a dangerous operation, less perhaps from the incision into the rumen, which will bear severe treatment with comparative impunity, than from the escape of food into the abdomen, and the inflammation it will necessarily engender, which will certainly prove fatal.

LOSS OF CUD.

Loss of cud not only proceeds from the causes to which we have just alluded, but is often a marked symptom in other complaints, and may be taken as a sure evidence of disorder of the digestive organs. In severe inflammatory diseases rumination is generally suspended, as well as in states of constitutional debility and prostration of strength. In the former case the stomach will recover its powers as the animal improves; in the latter case the restoration of the strength by tonics, as gentian, is required, and cordials, with gentle aperients, may be also given; as four ounces of salts, one ounce of powdered gentian, and half an ounce of ginger, with a little ale and gruel, every other morning.

Loss of cud is often produced by an accumulation of dry or noxious vegetable matter between the foliations of the third stomach or manyplus, and to this affection we shall at once proceed.

RETENTION OF FOOD IN THE MANYPLUS, CALLED CLUE, OR FARDEL-BOUND.

We have described the manyplus as a sac provided internally, with numerous foliations or duplications of its articular lining, covered with multitudes of rough or hardened papillæ. In this stomach the food undergoes its last preparation for the abomasum, or true digesting stomach: it is situated between the liver and the right sac of the rumen, so that, when over-distended, it will press upon the former. Not unfrequently it may prove an obstruction to the return of blood to the heart.

As dissection after death proves, there are few severe diseases, especially of an inflammatory nature, as catarrh, enteritis, pleuritis, fever, &c., in which the manyplus is not affected; generally it contains between its duplicatures layers of comminuted vegetable matters tightly pressed, and as dry as hardened oatcake. At other times it is full of a soft pultaceous mass, emitting a putrescent and most disgusting odour. In both these cases no nutrient matter passes into the abomasum, the door of communication being blocked up. Sometimes the duplicatures of the manyplus are found to be gangrenous, and the abomasum in a state of high inflammation.

But it is not only from sympathetic inflammation, and consequent loss of function, that the manyplus is liable to suffer; it is often the seat of original disease, sometimes slow or chronic in its course, sometimes rapidly terminating in death.

The causes of this disease are obscure. It has been attributed to acrid plants; to a sudden change of diet, as from green fodder to hay, especially if bad; to coarse and fibrous food, whether green or dry. Sometimes it rages in certain districts, and produces great mortality.

As the causes are obscure, so are the symptoms. Cases have occurred in which the dried food must have been lying in the manyplus for several weeks (as was proved by the nature of the food) without materially affecting the animal's health. At other times an animal, previously in perfect vigour, is suddenly taken ill, and, in spite of all that can be done, falls and dies.

Generally speaking, this disease comes on with dulness, dryness of the muzzle, and protrusion of the tongue; the pulse is quick and hard; the membranes of the eyes and nostrils are bloodshot; the eyes are starting, the head is extended, the limbs are tottering, and the animal is unwilling to move. The bowels are constipated; the urine scanty, and either red or dark-coloured. In cows the secretion of milk is either stopped, or the milk is offensive both to taste and smell. As the disease gains ground, the determination of blood to the head becomes more manifest, the animal loses consciousness, the abdomen swells, the frame trembles, the eyes are glairy, the limbs become cold, and the animal sinks torpid. Many or most of these symptoms occur in other inflammatory diseases; consequently the diagnosis is by no means easy, nor are there any which enable the practitioner to say whether the food in the manyplus is divested of its juices, or is in a pultaceous state; yet these differences must result from separate causes. In the first instance we must suppose a violent contraction of the manyplus from some irritation, producing a firm pressure of the comminuted vegetable matter between the leaves of the stomach, which latter, acting like a screw-press, forces out the juice and superadded moisture of the mass, converting it into hard, dry, friable layers, which may be crushed to powder. In the second instance the inflammatory action of the stomach must produce a sort of paralysis, or loss of power, so that no action is exerted on the accumulating pultaceous matter, which gradually becomes putrid. But it would appear that in some part of the stomach the leaves may exert pressure, while in another part there is loss of power.

With respect to the treatment of this disease, when it occurs as a primary affection, much depends on its severity: the abstraction of blood will relieve the system; and this must be followed by copious aperient draughts, poured gently down the gullet, or slowly injected by the stomach-pump, the tube of which must be introduced for some distance into the œsophagus. The object is to throw the medicine into the manyplus, and thence into the abomasum, without its being forced through the pillars of the œsophagean canal into the paunch. A free operation of the medicine is a favourable symptom. Some writers recommend that a gentle stream of warm water, with a little Epsom salts dissolved in it, be transmitted into the manyplus, through the tube of the stomach-pump, with

the object either of diluting and carrying forward the pultaceous mass; or, on the other hand, of softening and breaking down the dry friable layers, and washing them into the abomasum. We doubt not that a perseverance in this plan might be productive of benefit; and certainly it could produce no evil consequences. Should the animal recover, the greatest caution relative to its diet is requisite. This should consist only of emollient mashes and thin gruel, till the stomach is enabled to take by degrees the most simple green food.

It appears to us that two diseases, termed wood-evil and redwater, are mere modifications of this affection of the stomach, or are symptomatic of its existence; and it is under this impression that we here notice them. They certainly are intimately connected with debility and functional derangement of the digestive organs; and an accumulation of matter is always found in the manyplus.

WOOD-EVIL, MOOR-ILL, OR PANTAS.

This disease is brought on in cattle by their devouring the acrid buds of trees, by bad winter provision, by impure water, and similar causes. It comes on with febrile symptoms, heat of the mouth, and quickness and hardness of the pulse; the coat is staring, the skin hide-bound; the eyes and nostrils are bloodshot, the thirst is great, and there is obstinate constipation of the bowels. The beast loses flesh, and exhibits a capricious appetite; it will pick up bones, sticks, pieces of linen, &c., and grind them for a long time in the mouth; the filthiest puddle is preferred to clear water; the urine is generally scanty; it has a red tinge, and a penetrating odour; the milk is affected and disgusting; there is an indisposition to move, and the animal utters moans indicative of internal pain; the shoulders and chest are stiff, the flanks heave, the limbs are unsteady, and the brain shows signs of congestion. Such are the symptoms in violent cases, in which, if the disease be not arrested, the animal dies. The appearances observed on dissection after death are inflammation of the bowels, of the fourth stomach, sometimes of the lungs, and a repletion of the manyplus with undigested and generally compressed vegetable matter. In these cases bleeding and aperients are the principal remedies; but in milder cases, where there is little or no febrile action, aperients alone may be trusted; or, if the abstraction of blood be deemed advisable, a small quantity only need be taken. A good aperient

medicine may consist of six drachms of Barbadoes aloes, six ounces of Epsom salts, two drachms of ginger, and a quart of thin gruel. Another, perhaps, generally speaking, to be preferred, may be made with eight ounces of Epsom salts, eight ounces of olive oil or linseed oil, and a quart of thin gruel.

RED WATER AND BLACK WATER

This disease must not be confounded with acute inflammation of the kidneys, attended by hemorrhage, which tinges the water with blood. Red water is indeed so called from the colour of the urine, and we have stated that such is its colour, in cases of retention of food in the manyplus, and in woodevil; but it is very doubtful whether the colour, in these diseases, is at all owing to the presence of blood. Mr. R. Thompson attributes it to the absorption of vitiated bile, which, passing into the blood, stains all the secretions; and this opinion is corroborated by the fact that, in red water at least, the liver is enlarged, inflamed, sometimes rotten, and the gall-bladder distended with thick dark bile. This is the view taken by most veterinary surgeons of the present day; and, as Mr. Spooner observes, it is "supported both by an analysis of the urine, and an examination of the viscera, in fatal cases."

As to the connexion of red water with disorder of the manyplus, we have the express testimony of many experienced practitioners. Mr. Youatt says, "The manyplus is perfectly dry; baking could hardly add to the hardness; were it not for its weight it might be kicked about as a football. The leaves of the manyplus cling to the food contained between them; the papillæ leave their evident indentations on the hardened mass; and that mass cannot be detached without considerable portions of the cuticle clinging to it. The fourth stomach is empty, and the lining membrane covered with brown mucus, exhibiting patches of inflammation underneath . . . . The kidney is of a yellowish brown colour, and sometimes a little enlarged; but there is rarely any inflammation or disease about it." He adds, that the lungs have a yellow tinge, and the fluid in the pericardium is yellow, the chyle in the lacteals yellow, the skin dark yellow, and also the conjunctiva of the eye. These are symptoms of jaundice.

Mr. White (late veterinary surgeon of the First Dragoons) states that, after a careful examination, he is of opinion that red water originates in weakness of the stomach, from feeding

on bad hay during the winter. "In cows that have died of this disorder we almost always find an accumulation of the fibrous parts of hay, in the third or foliated stomach, compressed into thin cakes, and matted together. The cuticular coat of the leaves of the stomach generally separates with those cakes of matted fibres, and the muscular coat is found weakened and distended."

There is considerable variety in the symptoms of this malady. Sometimes the urine is but slightly altered, sometimes it is of a deep yellowish red; at other times brown and turbid, and even of a blackish tint. When the latter is the case, it is termed *black water*. We can easily conceive that, from the continued bilious irritation of the kidneys, their minute vessels may at length begin to pour out blood; but, granting this to be the case, we are not to attribute the seat of the disease to these great excretory organs—they are passive sufferers only; we might as well regard the yellowness of the conjunctiva as indicative of disease of the eye. We need not wonder that, from the same cause, there is often distressing strangury, nor that dysentery should precede obstinate constipation of the bowels.

Practitioners, though they mostly agree as to the chief organs affected during the progress of the disease called red water, differ in their opinion as to its exciting cause: each judges from his own experience. Some, for example, attribute it to the noxious herbage of low undrained swampy lands; and there is no doubt that in such situations it is often prevalent. Others consider that it is of most frequent occurrence in dry and hilly districts, where little grass and less water is to be obtained during a hot summer, and instance localities of this description where it rages like an epidemic: we believe that they also are correct. Peat and moss lands have been known to produce this disease. It will result from feeding on the budding leaves of copses in spring, and the decaying leaves in autumn; and at these two seasons of the year it is most especially prevalent. A diet of bad hay during the winter will cause it; so will a sudden change of pasturage. The disease often occurs in cows after calving, perhaps from a change of diet, or some mismanagement; change of pasturage, from a stony or flinty soil to a heavy clay soil, has been known to cause it. It sometimes ravages a farm; while in the next, divided from the other only by hedgerows, it is unknown. Of two adjoining fields, one may be dangerous the other safe;

nay, a field safe during certain parts of the year, may be dangerous during another. Atmospheric influences may also have their effect; for it sometimes appears as an epidemic of a malignant character. Whatever, in fact, affects the digestive organs, including the liver, may give rise to attacks of this often fatal malady.

As we have already said, red water must be distinguished from inflammation of the kidneys, which is often combined with enteritis. True red water commences with dulness, languor, and loss of appetite; rumination ceases; the urine is at first brownish, and then of brownish yellow, and ultimately appears like dark porter: sometimes there is great strangury, but this is not an invariable symptom. The skin is of a dirty yellow; the eyes and nostrils are suffused with yellow, as is also the little milk that the cow may yield: its taste and odour are unpleasant. If blood be drawn, the serum, which separates from the coagulum, is of a brownish yellow. The pulse is quick; the animal can scarcely be forced to move; the loins are tender, and show signs of weakness; the ears and limbs become cold. At first diarrhœa makes its appearance, but only at first; but this suddenly stops, and is succeeded by obstinate constipation. The urine now becomes even still darker; the disease may be termed black water; the animal now rapidly sinks and dies.

The duration of this disease, from its commencement to its fatal termination, varies according to circumstances: it may continue for weeks.

It is rarely, excepting in the early stage of the disease, that the red water is curable. If the animal be robust, and the slightest febrile action present, moderate bleeding will be beneficial, but the flow of blood should be stopped as soon as the pulse is the least degree faltering. Some practitioners dislike the abstraction of blood in this malady, but we can see no danger if caution be used; and both Mr. Simonds of Twickenham, and Mr. Harrison of Ormskirk, who have had extensive experience in its treatment, resort, unless there be good reason for the contrary, to this mode of treatment. The next step is the administration of purgatives and injections. The purgative draughts should be gently poured down the gullet, or slowly thrown down by means of the patent stomach-pump; a good aperient drench may consist of twelve or fourteen ounces of Epsom salts, four ounces of sulphur,

ıalf an ounce of carbonate of ammonia, and half an ounce of ginger, in thin gruel or warm water.

After the first drench, smaller doses should succeed at intervals of six or eight hours, with a repetition of the injections, until the bowels act freely. Mr. Harrison states, that he has seen a scruple of calomel, given in a pint of yeast, produce purging when other remedies have failed, the life of the animal being thus saved when there was little hope.

After the bowels have been well purged, tonics and diuretics may be given; as a drachm of ginger, a drachm of gentian (in powder), and an ounce of spirit of nitrous ether in a little gruel twice a day.

As the animal improves the skin will become clear, the breathing easy, and appetite will return: still the urine, from previous irritation of the kidneys, may continue dark coloured or black. Under these circumstances, a few doses of oil of turpentine and laudanum (of each one ounce) in linseed tea may be given with advantage. Great attention must be paid to the diet, which should consist of mashes, gruel, linseed tea, and fresh vetches or meadow-grass, but never in large quantities at a time.

CONCRETIONS IN THE STOMACH AND MECHANICAL OBSTRUCTIONS OF THE ALIMENTARY CANAL.

Cattle are very apt, urged by some morbid condition of the stomach, to swallow various strange articles, as linen, leather, pieces of iron, &c., and such for example as handkerchiefs and other parts of dress, shoes, gloves, scissors, pieces of wood, bits of coal, and the like. Numerous instances of this nature are on record, and many farmers, no doubt, could supply others from their own personal experience.

Occasionally no mischief appears to result from this unnatural act, but generally the presence of these matters in the rumen produces irritation; the due performance of rumination is interrupted, the animal is dull, aperients have no beneficial effect, it becomes worse, and at last dies; when, the stomach being opened, the cause of the mischief is discovered. Scissors and other sharp instruments will sometimes work their way through the coats of the rumen, and protrude between two of the ribs; frequently they pierce the pericardium and cause death. Large substances interfering with the action of the rumen, while the animal still continues to feed, conduce to the distention of that viscus, and occasionally, on the per-

formance of the operation of opening that sac, the source of the evil is detected and removed.

It very often happens that bits of stick, iron, or stone, taken into the stomach form the nucleus of a large globular calculus, consisting of the various compounds of lime or silex, beautifully arranged in concentric layers. These concretions are extremely firm and hard, and when sawn into two pieces the flat surface of each takes as glossy a polish as marble. They vary in size; we have seen specimens of extraordinary magnitude. It is in the rumen principally, if not exclusively, that these calculi of the stomach are found, and their presence is often unsuspected until after death. Yet we cannot suppose that they produce no derangement of the digestive organs, and we believe that they are most commonly to be met with in beasts that do not thrive well, and that manifest irregularity of appetite. Whether they cause this, or are themselves the results of some morbid action continuing to exert an unfavourable influence, may be a matter of opinion; but of one thing we may be sure, they will not tend to the abatement of the morbid condition of the stomach which conduced to their formation: the rule of action and reaction may be reasonably suspected.

Cattle are prone to lick their own hides and the hides of each other. The hair swallowed passes into the stomach and becomes matted, by means of the saliva and mucus, into balls; a nail, a bit of stick, or a portion of fibrous vegetable matter, sometimes, but not always, constituting their nucleus. These bird's-nest-like balls are found both in the rumen and the abomasum. In the former, they are often mingled with vegetable matters, with threads of cotton, linen or woollen, with particles of earth, straw, and other substances. In the abomasum, they consist exclusively of intertwined matted hair. How long these balls may remain in the abomasum, and what functional derangements they may occasion, it is not easy to say. Sometimes, however, these balls either pass into the intestinal canal, or are formed there, producing a fatal obstruction. The farmer drenches the poor beast, but to no purpose; not perhaps that the medicine fails in its office, but a mechanical obstruction prevents its due operation; this only adds to the animal's agony, and it dies worn out by pain and perhaps inflammation. Could the nature of the obstruction be ascertained, some measures perhaps might be resorted to; and even when circumstances lead to a sus-

picion of the real state of the case, though it be suspicion only, no harm can be done by acting as if it were confirmed. Injections to a large extent of soap-water and oil should be administered, and that repeatedly, and a pint of linseed oil, with twenty grains of the farina of croton-seed, or twenty drops of good croton oil may be poured slowly down the gullet; this purgative, with a little gruel, may be repeated every eight or ten hours, till the obstruction be forced. Should pain and fever render it desirable, blood must be taken away, and it may be necessary to repeat the bleeding.

Balls of hair, however, are not the only mechanical obstructions of the alimentary canal. Balls of hard undigested fibrous vegetable matters, sometimes mingled with hair, threads, and extraneous articles, but by no means always so, are often impacted in the lower bowels: medicines give no relief, and the animal sinks after enduring indescribable agony. The same treatment must be repursued as that already described, and not unfrequently the hand, if the substance be in the rectum, will better remove the obstacle than any medicine. This observation applies both to hair-balls and to hardened fæcal matter. Horses are very subject to this ob struction, and it occurs frequently in cattle fed too much upon dry food. Some recommend in these cases, besides purgative medicines, injections of tobacco-water (an ounce of tobacco infused in a gallon of boiling water), but in the use of this injection great caution is requisite. We have known it prostrate the nervous system even to dissolution. It may be tried as an ultimate resource. We are inclined to recommend injections of oil, gruel, and laudanum (of the last two ounces), in cases where the straining produces agony; the opium may not only ease the pain, but cause the muscular fibres of the lower bowels to relax from their constriction, while it will not interfere with the operation of the purgative medicines.

ENLARGEMENT OF THE MESENTERIC GLANDS.

We have said that, in the mesentery, to which the bowels are attached, there are numerous glandular bodies through which the lacteals or nutrient ducts pass in their course to the thoracic duct, or great receptacle of the chyle. In the ox, as in the human subject and other animals, these glands are liable to enlargement; they are affected with a scrofulous disease, and in this condition arrest the currents of nutrition; the abdomen swells greatly, the limbs and frame become

emaciated, the eyes sunk, the membranes of the nose and mouth pallid, the respiration hurried, the pulse quick, and the prostration of strength extreme; there is often an unpleasant cough and other symptoms of consumption, which increase till the animal dies, almost a skeleton. Sometimes tumours can be felt by passing the hand over the surface of the abdomen, but this is not always the case.

In such a disease little or nothing can be done. Doses of mercury and opium, as two scruples of calomel and half a drachm of powdered opium given every evening, with tonic draughts (gentian, or infusion of cascarilla) during the day, may perhaps mitigate the symptoms. To these remedies occasional aperients may be added. Eight or ten grains of iodide of potass, divided into two doses, may be given daily in gruel, the quantity of the iodide being gradually increased to ten grains for each dose. If this be used, the mercury and opium must be omitted. Warm stabling and good food are of course essential. After all, little, we repeat it, can be done; the disease has generally made great progress before it is suspected, and it runs its course. Frequently it is associated with a tuberculous state of the lungs, and also with enlargements of the glands generally.

Though mature cattle are not exempt from this malady, it occurs most commonly in young weakly beasts, poorly fed, and reared in low damp situations. Let it be remembered that, as in consumption, the tendency to it is hereditary. It is, in fact, a form of consumption the index of a scrofulous diathesis.

POISONS.

Cattle sometimes partake of poisonous plants, as the water-hemlock, the yew, and others, and perish in consequence; nor is it easy to determine from the symptoms alone that they are suffering from such a cause. The animal is torpid, and swells; its thirst is excessive, but it refuses food; it grinds its teeth, evidently from agony; stamps, paws the ground, strikes at its flanks, and sometimes rolls on the ground, as if labouring under spasmodic pains of colic.

Occasionally the animal becomes infuriated, as if agitated by frenzy; this state of madness continues for a longer or shorter period, ending in general palsy, torpor, and death.

Examination of the body, in these cases, reveals inflammation of the paunch and reticulated stomach; and often

also of the abomasum and small intestines; while the many-plus is filled with hardened vegetable matter. The cuticular coat peels readily from off the muscular coat of the rumen and reticulum or honeycomb—the sign of commencing disorganization; and the abomasum is not unfrequently ulcerated.

If it be ascertained that an animal has fed on noxious plants, instant recourse must be had to the stomach-pump; the stomach must be deluged with water until the rumen overflows, and the contents are rejected by vomiting. Nor will one operation of the kind be sufficient, it must be repeated; and afterwards smart aperients, consisting of salts, oil, and gruel, must be slowly poured or injected down the œsophagus, and repeated every six or eight hours until the bowels are well purged.

Supposing that there be a mere suspicion that poison of this kind (known to be accessible) has been taken, but that in reality the symptoms arise from some distention of the rumen only, attended by severe colic, still no harm will be done. The rumen will be relieved, and the bowels emptied of irritating matter; and a cordial, with a little opium, will complete the cure.

With respect to mineral poisons, it is not often that they are accidentally swallowed by cattle. Arsenic may indeed be given wilfully, and perhaps a piece of bread-and-butter, sprinkled with arsenic for the destruction of rats, may be left carelessly in the way of cows, and devoured; but these are rare cases. No one can tell the cause of the horrible suffering endured by the poor animals; they die, and perhaps after death the presence of poison is detected in the stomach. Let us, however, suppose it to be known that arsenic has been swallowed—what is to be done? A quantity of lime-water or of chalk and water must be injected into the stomach, and, after remaining a few minutes, pumped out, a fresh quantity being injected. This may be repeated two or three times, and at last a fresh quantity injected and left, in order to neutralize the arsenic, if any remain in the stomach. Aperients of salts and oil must then be given, and their operation assisted by clysters of oil, salt, and gruel.

Corrosive sublimate (bichloride of mercury, or oxymuriate of mercury), though never given internally to cattle, is often rashly used by ignorant persons as an external application to ulcers, mangy spots, and other cutaneous affections. It is a most dangerous remedy; for it will pass into the system by

absorption, and produce serious illness, or even death. The animals become dull, they cease to ruminate; frothy saliva drops copiously from the mouth; they moan, and move restlessly; strike at their flanks, and are tormented with violent and often bloody purging. After death, traces of active inflammation appear in the intestines, and in the rumen, honeycomb, and abomasum. In this case, the remedy will consist of the white of a number of eggs beaten up, and mixed with a little gruel: this mixture must be gently poured down the gullet, and repeated every hour till the symptoms abate; aperients may afterwards be administered, and copious injections of gruel. Too often, however, all remedies prove useless; frequently there is no time to have recourse to them.

We may now pass on to a consideration of some of the more local and external diseases, or injuries to which cattle are subject, the treatment of which, by the ignorant cowleech, often produces irreparable mischief.

There are two diseases to which the horse is subject, but, as there is reason to believe, not the cow: we mean glanders and farcy: at least no well-authenticated cases are on record. One of the symptoms of farcy in the horse, is inflammation and thickening of the absorbents, especially at the valves; the absorbents have a corded feel, and at greater or less distances along their course, where the valves are situated, small tumours or buttons arise, arresting the current of the fluid contained. Farcy is a highly contagious disease, and often accompanies glanders; but though true contagious farcy either does not occur or very rarely occurs in the ox, inflammation of the absorbents is not uncommon.

INFLAMMATION OF THE ABSORBENT VESSELS OF THE SKIN.

As in farcy the absorbents are corded and show buttons at the valves along their course, these buttons become hard and scirrhous, and some suppurate, and degenerate into ulcers. This disease may be more or less extensive, and may result from various causes, as from wounds rendered foul and irritable by improper dressings, from diseased hoofs, or ulcers of some of the joints of the limbs. The absorbents running from these wounds or ulcers become irritated and inflamed, and the whole system sympathizes. As soon as the ulcers heal, the active inflammation of the absorbents subsides, though a thickening or cording of their tissue may remain for a considerable period. During the stage of inflammation

the buttons often burst, and ulcerate, producing considerable mischief. They are extremely difficult to heal, but still there is no danger of contagion.

Mr. Youatt describes the cases of four oxen, which at different times, respectively, during the course of three years, were seized with what the farmer to whom they belonged considered as farcy:—cording of the absorbents, with farcy buds or buttons extended up the limbs from the fetlock to the fore-arm; some of the buds were scirrhous, others in a state of ulceration. In each instance the animal laboured at the time under a severe cough. Simple treatment, and the application of the hot iron to the buttons, effected restoration to health; the wounds healed, and the thickening of the absorbents subsided, the cough at the same time disappearing.

In two months afterwards, the cough and thickening of the absorbents returned, and the same means were again resorted to with the same success.

Although these were believed to be cases of farcy, and they certainly bore a close resemblance to that disease, yet Mr. Youatt is decidedly of opinion that it was in resemblance only that the agreement consisted, and that when such cases occur the farmer need not entertain serious apprehension of the baleful disease known as farcy breaking out in his herd.

DISEASES OF THE EYE AND EYELIDS.

The eye of the ox is very subject to injury from blows, from thrusts with the prong of the stable-fork, and from the horns of other cattle; sometimes the eye itself is destroyed, sometimes bony tumours or excrescences are formed on the ring of the orbit, and sometimes the superciliary ridge of the orbit is fractured. In these cases little can be done, but they ought never to have occurred. When the superciliary ridge is fractured, the fractured portion must be readjusted as well as possible, and secured by a bandage, and bleeding and purgatives resorted to in order to allay fever and inflammation. Bony excrescences may be sometimes removed by means of a fine saw, the root being afterwards slightly touched by the cautery. In other cases their growth may be checked and exfoliation produced by the application of the cautery, at a low temperature, but a fine saw or chisel is always preferable. These excrescences not unfrequently degenerate into a state

of caries. The animal should be destroyed, and the sooner the better.

Ophthalmia often arises in cattle from injury to the eye, or from the presence of irritating substances lodged beneath the eyelids. Sometimes it proceeds from constitutional causes alone, and returns periodically: indeed, this form of ophthalmia is hereditary, like consumption, and a radical cure is almost hopeless. Ophthalmia arising from irritating substances, or from blows, generally yields to bleeding, to purgatives and fomentations, or the goulard lotion (composed of the liq. plumbi super-acetatis and water), with a little laudanum; when the active inflammation is subdued, a lotion of the sulphate of zinc (white vitriol) may be used with advantage. Periodical ophthalmia, though relieved for a time, usually terminates in blindness; it might perhaps be treated with good effect by small doses of calomel and opium, repeated daily for a short time, and by mercurial lotions; but when the character of the disease is ascertained, the farmer prefers preparing the beast for the slaughter-house; and probably this is his best course.

Severe inflammation of the eyes, with eruptions about the mouth, and swellings of the tongue and throat, often occur in young cattle fed on wet pasture-lands, especially if much wooded. Sometimes superficial ulcerations of the cornea make their appearance, and if the case be rashly treated blindness will ensue. It may be as well under these circumstances to take away a little blood; gentle purgatives must be administered, and the eyes fomented with warm water or a decoction of poppy-head; some prefer cold evaporating lotions, as cold water with a little spirit, the goulard lotion, and afterwards a weak wash of sulphate of zinc. Change of locality is essential, and while the disease continues, the animal should be housed.

Cataract and amaurosis or gutta serena are not unknown among cattle; the latter, however, is very rare. In the aqueous chamber of the eye of the horse a small hair-like parasitic worm, nearly an inch in length, has been occasionally discovered; and we believe that in the eyes of horned cattle a similar parasite has been known to occur, accompanied by the ordinary symptoms of ophthalmia.

The eyelids of cattle are frequently affected with diseases, independent of the inflammation which extends to them in cases of ophthalmia; the edges, along which the sebaceous

glands open, are sometimes subject to a pustular eruption and ulceration; in these cases the skin is often mangy, and the animals are in wretched condition. Aperients of sulphur, and alteratives, consisting of one drachm of æthiops mineral (sulphate of mercury), two drachms of nitre, and four of sulphur, given every night, will be found useful; the eyelids must be smeared with the ointment of nitrate of mercury (ungt. hydrargri nitratis, P.L.), more or less diluted with pure spermaceti ointment, or pure olive oil, every night and morning, by means of a camel hair-pencil (no iron must come in contact with the preparation). The ointment of the nitric-oxide of mercury (ung. hydr. nitric-oxyd. P.L.) diluted in a similar way is also valuable. This is essentially the golden ointment, so much in vogue.

Warts occasionally form on the eyelids and prove troublesome: these may be removed by means of a sharp pair of scissors, the places being afterwards touched with lunar caustic. In weakly or aged cattle, ill-fed and out of condition, an œdematous or dropsical swelling of the eyelids not unfrequently occurs, the cellular tissue being puffed up with serum, infiltrated into it; the tumefaction *pits*, upon pressure, like dough. A restoration to good health and strength is the only remedy.

In high-fed and fattening oxen, on the contrary, the eyelids are found to be puffed up by some gas, which distends the cellular tissue: a slight scratch with the point of a lancet will allow of the escape of the gas, upon pressure; but it is better to let the eyelids alone, and give a dose of physic.

The haw, or membrana nictitans, of the eyes, is sometimes found to be swelled, inflamed, and even ulcerated from irritation; and is not unfrequently enlarged and protruded in consequence. Cooling mashes, as goulard lotion, with a little laudanum, will diminish the inflammation, and afterwards the astringent solution of sulphate of zinc (from two to four grains to an ounce of pure water), must be applied two or three times a day, to the part itself, a camel-hair pencil being used for the purpose. This treatment, if persevered in, will often effect a cure. Where fungous excrescences sprout, they may be delicately touched by the caustic. The haw should never be removed if possible; this moveable curtain cleanses and defends the surface of the eye, and its loss is a serious inconvenience. In some cases, however, the

veterinary surgeon may advise its excision, and to him alone must the operation be intrusted.

FOUL IN THE FOOT, LOO, OR LOW.

The foot of the ox is extremely vascular; the bones of the toes are perforated by numerous veins and arteries; the veins are larger and more tortuous than in the horse, and are very conspicuous on the pastern. It is from this vascularity that sprains of the foot, to which from its bifid character it is peculiarly liable, are so often followed in the ox by serious consequences, or that accidental wounds produce so much inflammation. Scarcely a drove of cattle passes along the road, among which several of the oxen are not lame; and it is on the feet that the brutal drover ever and anon strikes them to hurry them along, haply to their slaughter. Often have we traced the course of a herd of oxen by the blood-stains on the road: the feet are not only strained, the joints swelled and inflamed, but the hoof is worn to the quick or wounded by sharp flints, or thorns, or pieces of fractured glass. Rest, fomentations, and dressings of tar ointment for the hoof, will generally effect a restoration; but if the lameness be severe, bleeding from the veins of the coronet, and that to a considerable extent, is absolutely requisite; for in the joints of the toes inflammation sometimes induces anchylosis. The veins may be opened by a sharp scalpel or drawing-knife, by a lancet, or a small fleam. Severe wounds of the toes, after being well washed, may be dressed with Friar's balsam on a pledget of lint, rag, or soft tow, bound on by stout rollers or bandages.

Thorns, nails, pieces of glass, &c., remaining unnoticed in the foot, between the toes, or on the sole, often produce unpleasant abscesses; and inflammation of the parts within the hoof, from over-driving on hard roads, will occasionally end in the same result, especially if the horn be worn to the quick. When oxen are pricked by a nail in bad shoeing (we allude to working oxen), as is so frequently the case in horses, abscesses and sinuses will form; these are termed quittors in the horse, and are not easily managed.

When a travelled beast continues lame after rest, sufficient for the restoration of footsore cattle, or when a beast begins to limp, the lameness rapidly increasing, let it be secured and the foot carefully examined. Suppose a nail or similar substance be found driven into the sole, or any part of the hoof,

common sense will direct its extraction, and its extraction will be probably followed by a flow of purulent matter. Suppose there be a punctured wound only, with inflammation and an abscess more or less deeply seated: in both cases the hoof around the spot must be neatly and cautiously pared down, and, as far as it has separated from the parts beneath, removed; let the abscess be opened, and the purulent matter have a free exit A poultice of linseed meal may be then applied and changed twice a day, and in a few days, if all goes on well, and healthy healing take place, a little butyr of antimony sprinkled over the denuded part every day will induce a new secretion of horn, while a simple bandage, or a pledget of soft tow, bound over the whole, will be a sufficient dressing. If fungous granulations appear, they may be levelled with a sharp pair of scissors or a knife, and touched with caustic.

If on examination of the foot of a lame animal no wound appears, it will be necessary to try the hoof in every part by a pair of pincers, and when the pressure gives pain, indicated by the flinching or shrinking of the animal, let the horn be there shaved away and the abscess laid open.

Perhaps, however, suppuration has not commenced, but the inflammation is strong and active: under such circumstances, the foot must be well fomented, and afterwards enveloped in a large linseed-meal poultice; this will soften the horny hoof, and promote the suppuration, while at the same time it relieves the pain and inflammation. In due time the abscess shows itself on the coronet, and must be opened by a lancet; the direction of the sinus should be ascertained by a probe, and the horn shaved away along its course so as to lay it open; should there be several sinuses, the same plan must be resorted to with each. Poultices must now be renewed until healthy granulations appear, and every particle of loose or unsound horn must be removed; butyr of antimony may now be lightly applied, or the wound may be dressed with Friar's balsam on lint; this must be renewed every day, and a bandage wrapped firmly and evenly round the hoof.

Cattle, especially such as are fattening upon stimulating food, are subject to inflammation, cracks, soreness, fungous excrescences, and a fœtid discharge between the toes. If the disease be neglected the inflammation extends; in a few days abscesses form and burst, and others succeed until the foot

becomes completely disorganized: the animal in the mean time wears away, and becomes a miserable object; the toes are now thrown far apart, the bones become carious, sinuses extend in all directions, and purulent matter is profusely discharged. In this state the animal may linger for several months, until it dies worn out by pain and exhaustion.

A common but brutal remedy in these cases is to rub a tarred rope or horse-hair line to and fro between the hoofs, in order to remove the excrescences and stimulate the surface to secrete healthy horn; dressings of stimulant applications are afterwards applied.

If the inflammation be high, bleeding from the veins of the coronet and aperients are necessary. A linseed-meal poultice may then be used, and renewed twice a day until suppuration has taken place, and the sloughing ulcers assume a healthy appearance. A little turpentine may be added to the poultices. Fungous granulations must be touched with the caustic, or sprinkled over with verdigris or sugar of lead.. In cases where there is a foul fœtid discharge, a lotion of a solution of chloride of lime will prove serviceable. When the ulcers are healthy, they may be dressed with tincture of myrrh, or Friar's balsam. Stall-fed cattle should be turned to grass.

Some practitioners recommend the application of the following ointment, as soon as the ulcers are cleared by the poultice: viz. hog's-lard and turpentine, of each four ounces; melt together over the fire, and as soon as removed from the fire, stir in one ounce of blue vitriol very finely powdered, and continue stirring till the ointment is cold.

DISEASES OF THE SKIN.

Cattle kept in wretched hovels or cow-houses, or badly fed on unwholesome food during the winter, are liable to mange. It is said that too luxurious a diet will produce it, but we have never known it result from such a cause: often, however, from neglect of cleanliness, and a scanty pittance of innutritious food. It commences with a violent itching: the tormented animal rubs itself against posts, palings, gates, or the boles of trees; the hair about the neck, shoulders, and sides, is soon worn off, and the skin is red, thickened, and rises in long ridges or creased folds. The cow becomes dull, feeds little, loses flesh, and fails in her milk. In some places a thick scurf appears, in others sores or scabs, from

frequent and violent rubbings. Occasionally the surface of the skin becomes covered with scabs, which peel off, and are succeeded by foul ulcers. In the mean time the animal is infested with lice; they abound in myriads, tormenting the miserable creature, and combine with the disease of the skin to render it an object of disgust and apprehension. Not only are these parasites communicated to healthy cattle in the same field, but the disease of the skin also; the slightest contact, or the circumstance of lying on the same spot, is sufficient to cause the communication either of the mange or of the lice, or of both.

Cattle infected with the mange should be kept strictly apart from all others; the first thing to be done is to render the skin as free from scurf, loose hairs, and dirt, as possible; this may be done by means of a wisp of straw, or the curry-comb: then let a strong sulphur ointment be well rubbed in with a hard brush.

The following ointment generally succeeds:—

Flowers of sulphur, one pound; turpentine, four ounces; strong mercurial ointment, two ounces; and linseed oil, a pint. Warm the oil, and mix the turpentine and sulphur with it, incorporating the whole well together; afterwards add the mercurial ointment, by rubbing the whole together in a large mortar, or by means of a stout spatula on a slab.

This ointment must be carefully applied to every part, and will soon begin to take effect. In the mean time, it will be well to give internally six or eight ounces of sulphur, with a drachm or even two of æthiops mineral, every third day.

Some persons employ tobacco-water, as a lotion in this disease, but this is a dangerous remedy; it causes trembling, sweating, utter prostration of strength, and sometimes even death. Others use a strong solution of corrosive sublimate, a still more dangerous application, and one which has caused the death of cattle in numerous instances. We have alluded to its effects when noticing *poison*. If this deadly poison is deemed requisite in very inveterate cases (and it is better in these cases to effect a *gradual* than a *rapid* cure), the following prescription is recommended:—

℞	Hydrarg. per-chlorid. . . .	ʒ ij.
	Acid. Muriatic.	ʒ ss.
	Aquæ destillat.	ʒ xvj.—M.

We purposely write the above prescription in this manner, in order that it may be made up by no one (the veterinary

surgeon excepted) but a respectable chemist. Before using it the animal must be well washed with soap and water, by means of a hard brush; the lotion may then be applied in small quantities, and not at once, over an extensive surface, lest mischief occur. We cannot, however, conclude, without strongly advising the farmer to have nothing to do with it himself, nor to allow it to be applied by the cow-leech. The veterinary surgeon will avail himself of it, only when all other means have failed, and knowing the danger, will act with due caution.

When cattle are infested with lice alone, these may be destroyed by an ointment consisting of four or five ounces of sulphur, four ounces of turpentine, and twelve ounces of linseed oil. It is said that the powder of stavesacre, mixed with lard and train oil, will kill these parasites. It is generally believed that the mange in cattle, like the scab in sheep, and the itch in the human subject, is immediately caused by the presence of numbers of a peculiar species of mite (acarus), which produce minute pustules in the skin, within which they live and multiply, and thus extend the disease from one part to another: they are tiny skin-burrowers, tormenting the animal, and feeding on the serum or water within the pustules, caused by their irritating presence. Though this is true with respect to the human subject and the sheep, we do not know whether these minute parasites have been demonstrated in the skin of horned cattle.

WARBLES.

Waroles are tumours on the skin of cattle, produced by the presence of the larvæ or maggots of a species of gad-fly, or breeze (*Œstrus Bovis, Clark: Hypoderma Bovis, Latr.*), a dipterous insect, notorious in ancient as well as in modern days, and which the Romans, as Virgil states, termed asilus; the Greeks, œstrus.

Farmers are mostly careless about warbles; but these suppurating tumours render the hide of the beast less valuable to the tanner; so that, if for no other reason, the larvæ should be destroyed: the best way is by crushing them, and pressing them out with the finger. It is some time after the destruction and expulsion of the larva that the cell is filled up; even then a weakness and a disposition to crack remain for a long period.

WOUNDS, BRUISES, STRAINS, ETC.

Cattle are subject to wounds from various sources. They often stab each other with their horns; they sometimes run against sharp hedge-stakes, or the points of sharp agricultural implements, and similar articles. These wounds are sometimes very deep, and the cow-leech aggravates the mischief by irritating applications: he applies the same to trifling wounds, and converts an accident of little consequence into an affair of some magnitude.

When an animal has received a deep and formidable wound, as in the chest, the shoulder, the neck, or side, but yet no vital organ is injured, the first thing to be done is to prevent high fever and inflammation. Blood must be abstracted, and saline aperients administered; then let the wounded part be well fomented with a decoction of poppy heads, next covered with soft lint, and a large linseed-meal poultice placed over it. These must be repeated till the inflammation be subdued, and the wound begins to discharge healthy purulent matter—the sign of the commencement of granulations. It is requisite that the wound should heal up from the bottom, and that the matter should have a free vent; it will be now therefore necessary to introduce a tent or plug of soft tow, of sufficient size, smeared with a digestive ointment, which may consist of lard and turpentine, of each four ounces. Melt these together, and add an ounce of verdigris (acetate of copper). This will keep down the granulations at the sides and upper part of the wound, while they are filling up the bottom. It is sometimes necessary to enlarge the external orifice of the wound to allow of the escape of matter; for if this be confined it will lead to extensive suppurating sinuses, and other mischief.

It often happens that wounds bleed freely, some large vessel being injured. This generally is not attended with danger; but if the flow of blood continue longer than is deemed prudent (for it will relieve the animal), it may be stopped by firm pressure adapted to the situation of the wound. In managing this some judgment is requisite; for it is not always easy to secure the compress. The bleeding having ceased, the treatment already described must be pursued.

If the sides of the chest of a beast be punctured, but as far as can be told the lungs have escaped uninjured (for should they be lacerated there will be little or no hope), the wound

must be closed, and kept closed by stout adhesive plaster, and the treatment recommended in pleuritis adopted. Bleeding, aperients, and doses of nitre combined with digitalis and tartarised antimony, are the chief medicines. The wound must be looked at in a day or two, and healed by tents, as described, from its deepest part; if it discharges matter, this must have vent externally. We need not say that the case is pregnant with danger.

It not unfrequently happens that the abdomen is wounded, and that some of the bowels protrude. These should be first cleaned from dirt with warm water, and then be gently and cautiously returned, even if be necessary to enlarge the wound for the purpose, and to throw and secure the beast with cords. The edges of the wound must then be brought together, and secured with stitches of thread, in the skin only, or with metallic sutures, which are better and not liable to give way. A bandage should be neatly and closely applied, its folds being brought round the body, and prevented from slipping. The medicinal treatment will consist of bleeding, aperients, &c., according to the symptoms which supervene.

In all these cases the aid of a veterinary surgeon is quite indispensable. His anatomical knowledge will be called in requisition, and the farmer must rely on his judgment. Nerves, tendons, and ligaments are often lacerated by wounds; and injuries or fractures of bones may occur. The peculiar line of treatment to be pursued in each case (and no two cases will be precisely alike) must be directed by the experienced practitioner.

When cattle meet with severe strains or bruises, it will be often necessary to take away blood and administer aperients. The injured parts must be well fomented, and afterwards covered with a poultice, if the situation of the part will admit of it. When the inflammation has subsided, but swelling and stiffness remain, a stimulating embrocation of oil, hartshorn, and turpentine, will be very useful.

It often happens that severe strains produce inflammation of the fetlock or the pastern-joints, accompanied by swelling, heat, and great tenderness. Bleeding from the veins of the coronet, poultices, rest, and afterwards embrocations, constitute the plan of treatment: blisters, should the stiffness not subside, will be needful. Too frequently these strains of the feet are neglected, and result in permanent lameness; callus or a bony deposit, is formed around the joints, producing a

ring-like exostosis, and the beast is crippled, and hobbles along, suffering great pain at every step. In these cases, neurotomy—that is, dividing, or rather cutting away, a small portion of the sentient nerve which supplies these parts—is recommended by Mr. Youatt; indeed, he was the first to propose it, and his plan has been found successful. This operation can be performed only by the veterinary surgeon.

GESTATION AND PARTURITION

The natural period of gestation is generally stated as two hundred and seventy days, or nine calendar months, but there is considerable variation in this respect; according to the experience of some breeders, the average is two hundred and eighty-four, or two hundred and eighty-five days; sometimes the period is still longer, and under these circumstances the offspring mostly prove to be bull-calves. The pregnancy of a cow may be determined by a practised ear, or by means of the stethoscope, in as early a stage of it as six or eight weeks. If the ear or instrument be applied to the right flank, beginning on the superior part of it, and shifted backwards and downwards, the pulsation of the head of the fœtal calf will soon be heard, twice as frequent at least as that of the parent; each pulsation will betray the double beating of the fœtal heart, and the rushing of blood through the vessels of the placenta will at the same time be audible.

The cow has now to nourish the fœtus; still for some months, if in good condition and not half-starved, little difference will be perceived in the quantity of milk yielded. At length the decline of milk is palpable, and for a month or three weeks at least before the anticipated time of calving, she should be allowed to dry. Cows in poor condition should be dried at least two months before calving, otherwise from deficiency of nutriment the calf will be stunted, weakly, and, even if it live, of little worth. Too high and luxurious feeding must on the other hand be avoided, for fever and inflammation are then apt to follow parturition.

Besides the reasons for drying the cow before calving to which we have alluded, another is, that if the animal be milked too long, so that on calving the new milk descends into the udder, while the flow of the old milk continues, there is imminent danger either of puerperal fever, or of inflammation of the udder. Experience has abundantly proved that on these grounds alone, the cow (though yielding a

tolerable supply) should be dried before the secretion of new milk for the expected young one commences.

Other precautions must be taken with regard to cows in the latter months of gestation, and especially as the time approaches. The bowels must be kept in a relaxed condition, and the food should be limited in quantity; at all times the rumen, when loaded, presses upon the uterus, but more especially so during gestation, and should the rumen become distended with food or gas, or the manyplus become filled with hardened and matted vegetable fibres, arresting the due and healthy process of digestion, the pressure of the enormous rumen may conduce to the destruction of both parent and offspring. It sometimes occasions an alteration in the position of the fœtus, it always renders parturition difficult, and fatal cases oftener, perhaps, arise from this than from any other cause. Farmers in general seem to be little aware of the necessity of regulating and moderating the diet of cows on the eve of parturition, yet there are few who have not lost cows from this neglect. The food allowed, moreover, must not be stimulating; the system takes on at this time a febrile excitement; hence in cows which have been high fed in rich pastures, or on much dry food, it will be well to have recourse both to a mild dose of aperient medicine and the lancet, blood being taken in moderation according to the strength of the subject.

It is the absurd and cruel practice of some, when they observe the precursor signs of parturition, or even when the latter has commenced, to rouse the cow and drive it about, hoping, we suppose, thereby to hasten the process which nature herself has undertaken to regulate, implanting in the beasts instincts obedient to her law. The consequence of this ignorant, brutal practice is inflammation and all its train of evils, and not unfrequently death. What does instinct teach the animal? to leave the rest of her companions, to retire to some quiet spot, to the shelter of the hedge, or the side of a coppice, in order that she may escape disturbance till she has brought forth her young. The wild cattle, when they calve, select some sequestered situation, amidst the dense thickets of the wood; there they hide their progeny, and go several times every day to suckle it, remaining near it at night. The domestic cow has lost her original shyness, but still she seeks an undisturbed spot and quits the herd.

If her pasture afford no shelter, the cow should be put

into some quiet retreat, and be housed in severe or stormy weather.

The precursor signs of parturition are too well known to be minutely detailed; restlessness, moaning, a visible and rapid enlargement of the udder, accelerated respiration, and a dropping of the abdomen, first attract notice. Soon, the restlessness increases, the animal keeps getting up and lying down; at last she remains lying on the ground, and if all go on well, is soon delivered of her offspring.

In all cases of difficulty, the aid of the veterinary surgeon is imperatively demanded, and the after-treatment should be intrusted to his care, as puerperal fever and inflammation of the udder are not unfrequent sequels.

SORE TEATS.

Cows after calving, and especially young cows, are very subject to tenderness and soreness of the teats. They become inflamed, often excoriated, or covered with cracks, from which a sanious discharge oozes. Those who milk the cattle are often very careless both as to the dipping of this discharge into the milk, and to the pain which they inflict on the cow. In both points there is nothing to excuse them, nor can language too severe be applied to them. Many a good cow is spoiled by the milker. Under the pain inflicted the animal often kicks violently, and this will at last become habitual; she will retain her milk, and contract a habit of retaining it, by which its quantity will speedily become diminished. The cow requires soothing and gentle treatment; the teats before milking should be well cleaned, and fomented for some time with warm water, in order to ease and mollify them. No unnecessary violence in milking should be used, but at the same time the udder must be thoroughly drained, for it is seldom that the teats suffer without the udder in some degree participating in their tenderness; and a slight cause may aggravate this into positive inflammation. After milking, the teats may be dressed with a cooling and somewhat astringent ointment, composed of two drachms of sugar of lead, and a drachm of alum finely powdered, added to four ounces of spermaceti ointment.

COW-POX, OR VARIOLA.

It is to Dr. Jenner, of Berkeley, Gloucestershire (who died February 21, 1823, aged seventy-four), that we owe the prac-

tice of vaccination, as a preservative from the attack of that destructive scourge of the human race, the small-pox. The experiments of this philosophic man were begun in 1797 and published in 1798. He had observed that cows were subject to a certain infectious eruption of the teats, and that those persons who became affected by it, while milking the cattle, escaped the small-pox raging around them. This fact, known to farmers from time immemorial, led him to a course of experiments, the result of which all are acquainted with Yet in one opinion, an opinion in which many medical men of the highest eminence have coincided, Dr. Jenner appears to have been wrong. He regarded the cow-pox not as an original disease of the cow itself, but as one communicated to that animal from the horse. He conceived that the sanious fluid of the disease of the heels, called grease, so common in horses, was the source of the pustular eruption in question. Cows, feeding in the same pasture with horses thus affected, might lie down on the spots where the sanious discharge from the grease had dripped, and in this manner the teats might become inoculated; or persons who had dressed or rubbed the heels of horses might with unwashed hands engage in milking the cows, and thus inoculate them. But query, Will the matter of grease produce the cow-pox in man or animals? Will inoculation from the diseased heels of the horse produce in the human subject the true cow-pox pustule, and exemption from small-pox? Inoculation with this matter may indeed produce a pustular disease, but not cow-pox. It may produce unpleasant sores, and convert simple cuts into festering wounds; these, however, in no respect bear any analogy to the vaccine disease. Various experiments have been made on the subject by Woodville, Simmons, Professor Coleman of the Veterinary College, Bartholini, Dr. Pearson, and others, which demonstrate the error of the theory; and though there may be some few medical men who yet retain the opinion, it has been abandoned by those who have closely investigated the subject. The two diseases, as the veterinary surgeon well knows, have nothing in common between them.

The cow is subject to two kinds of pustular eruption on the teats, both infectious, and usually comprehended under the same name; but of these one only must be regarded as the genuine cow-pox. In the spurious disease the pustules are small and of irregular shape; in the genuine disease

they are large and round, with a central depression, and accompanied by more or less of fever and general derangement. In both, however, they are filled with a limpid fluid, which by degrees becomes opaque and purulent. A scab is then formed, which in a short time peels off, leaving the skin sound beneath. If, however, the pustules are broken, they degenerate into ulcers—larger, deeper, and more difficult to heal in the genuine than in the spurious cow-pox. To distinguish between these two species of pustular eruption is important: the true disease may be known by the large size of the pustules, their depression, the decided ring of inflammation around them, and the constitutional disturbance of the animal. In both cases the treatment is simple; an aperient draught and a cooling lotion are all that is needed. If ulcers are produced they may be occasionally washed with a weak solution of chloride of lime, and powdered with a little calamine, or dressed with the calamine cerate of the London Pharmacopœia.

DISEASES AND TREATMENT OF CALVES.

From those diseases which more immediately concern the cow, we may now turn to those which peculiarly affect the calf, and which, setting accidents aside, are nearly all more or less connected with a deranged state of the digestive organs. In the calf, as we have said, while feeding exclusively on its mother's milk, the first three stomachs are undeveloped, the abomasum or true digestive stomach alone being required; but as it begins to partake of vegetable food the first three stomachs gradually increase, and begin to labour in the performance of the duties now imposed upon them. In both states the powers of digestion are often overtaxed; for the calf is apt to take more than it can properly digest, especially if not allowed free exercise, or if the bowels have not been cleared of the black excrementitious matter (meconium) with which they were loaded after birth. Some farmers refuse the first milk or *beastings* to the calf, ignorant that it is a purgative expressly intended by nature for this purpose; the consequence of which is that, early as it is to begin with medicine, some aperient is rendered absolutely necessary, recourse to which might have been prevented had nature not been interfered with. The mischief, however, is done; and the only question to be settled is, what purgative must be chosen? Two or three ounces of castor oil, mixed up with the yolk of an egg

into an emulsion, and a scruple of ginger, may be added to a little thick gruel to form a drench. This is a safe and generally an efficacious medicine; but no necessity for it ought to have existed.

Some farmers, again, anxious to render their calves fat for the butcher as expeditiously as they can, and forgetting both the natural weakness of the digestive powers and the small volume of the stomach (the first three being undeveloped), allow the calves either to suck *ad libitum*, or give them, if brought up at the pail—that is, by hand—a greater quantity of milk than can be digested. The idea of oppressing or overloading the stomach never enters into their minds. They imagine that the more food the young creature takes the more it will fatten; and they allow it no exercise lest it should "wear the flesh off its bones." The stomach soon becomes deranged; its functions are suspended; the milk, acted upon by the acid, coagulates, and forms a hardened mass of curd, which fills the abomasum even to distention. The muscles are now affected with spasms; they are violently cramped, and feel hard and knotted: this the farmer calls being affected with the *cords*. Flatulent colic next ensues, which often runs into inflammation and terminates fatally. Generally the bowels are obstinately confined; but this condition is sometimes preceded by diarrhœa. The quantity of hardened curd which is taken from the stomach after death is often enormous; and it is not unfrequently compressed into a mass resembling new cheese in appearance and solidity. We may easily form an idea of the agony which the poor little animal must have suffered; and we are sorry to say that numerous calves are subjected to it till released by death.

Prevention in these cases is easier than the cure: indeed, unless remedies be early applied, all attempts are futile. What can break up and dissolve a mass of indurated curd, filling the stomach and oppressing all its powers? As we have said, early treatment alone can be expected to succeed. Some practitioners recommend the frequent administration of warm water, in which two ounces of Epsom salts are dissolved; this they direct to be given by the stomach-pump; or if by a horn, to be poured gently down the gullet. Others recommend drenches of lime-water, potass, salts, and gruel, with the design both of acting upon the bowels, and at the same time correcting the acidity of the stomach. The farmer should always keep a bottle of "solution of potass in

lime-water" in readiness. Its preparation is directed as follows: Take a lump of quick-lime of the size of an egg, and pour on it in a convenient vessel as much water as will slake it. This being done, then pour upon it one pint of boiling water, stir the whole up, and cover close. While this is allowed to stand for some time, take an eight-ounce bottle, and put into it two ounces of subcarbonate of potass (salt of tartar), and fill up the bottle with the lime-water already made, pouring it off rather turbid than in a state of purity. Cork this up and label it: it is now ready for use. Take of this solution two teaspoonfuls, and add it to a little gruel or warm water in which an ounce of Epsom salts has been dissolved in order to make the draught, which may be repeated every six hours. If the calf suffers violent colic pains, a teaspoonful of tincture of opium, with a scruple or half a drachm of ginger, may be given; and injections of gruel, with a teaspoonful of tincture of opium (laudanum), administered. It is not always that this solution is in readiness, or that it can be quickly prepared; we recommend under such circumstances a drench, composed of a scruple or half a drachm of carbonateof ammonia, or two drachms of carbonate of soda, with two ounces of Epsom salts (sulphate of magnesia), and a little ginger, in gruel.

If the calf by these means be relieved, the next object is to prevent a recurrence of the mischief. A lump of chalk may be put into a trough near the young animal, and to which it has free access. The calf will lick the chalk, and the particles of this taken into the stomach will correct the acidity which is so apt to be generated in that viscus. It is a common plan to give chalk to calves under the idea that it makes their flesh white; this is a mistake, excepting so far as good health in the calf produces whiter and better veal. Three times a day only should the calf be allowed to suck, and then not to repletion; a bundle of sweet grass or good hay tied up with a string may be hung before it; it will be allured to pick a little, and the flow of saliva being excited, the digestion will be thereby assisted. If convenient, it may be allowed the range of a paddock or small field with advantage: the air, the exercise, and the smell of the fresh herbage, even its attempts to nibble, will prove beneficial. Weakly calves, and especially such as are fed by hand, often require, on recovering from this distention of the stomach, a total change of food; a raw egg beat up in gruel, made of grits or

arrow-root, with a little milk only, and some sugar, may be given for a few days, the proportion of the milk being gradually increased; should the bowels be confined, two ounces of olive oil will act sufficiently.

When the calf begins to change its milk diet for one of vegetable substances, it is liable to distention of the yet feeble rumen with crude materials, or to obstruction of the manyplus, which has not yet acquired sufficient power to act upon hard fibres. This is often the case, when the calf is allowed to feed too plentifully on hay. Dulness, fever, constipation of the bowels, and swelling of the abdomen, indicate the nature of the disorder, and unless prompt measures be resorted to, the animal will die. Aperients and the use of the stomach-pump will be required, the rumen must be unloaded, and the manyplus stimulated to action.

Calves are subject to diarrhœa, or scouring, from various causes; the milk may disagree with the stomach and disorder it, change of diet may produce it, or whatever has been taken which irritates the alimentary canal. If not severe, diarrhœa need not be regarded with apprehension; it is an effort of nature to get rid of the irritating matters, and only requires to be checked when it continues too long, or the animal begins to droop. Occasionally, diarrhœa merges into dysentery, with mucous and bloody purging. In the treatment of diarrhœa, a mild purgative, as two ounces of castor oil, may first be given, or three ounces of Epsom salts, two drachms of soda, and half a drachm of ginger, in half a pint of thin gruel. This will remove the cause of disturbance. Afterwards, four tablespoonfuls of the following mixture may be given morning and night:—Powdered chalk, one ounce; powdered catechu, four drachms; powdered ginger, two drachms; powdered opium, half a drachm; mucilage of gum arabic, two ounces; peppermint-water, six ounces. This mixture requires to be shaken up well each time it is given. Gruel, made of fine wheat flour, arrow-root, or bean mashes with a little pea-flour will be useful; no green or ascescent food should be allowed.

We have described the hoove in cattle, and that affection of the bronchial tubes (see "Bronchitis") in which they are crowded by innumerable parasitic worms. To this disease calves are extremely subject, and it often produces death. There is a hard husky cough, a staring coat, a heaving of the flanks, great debility and emaciation. After death the bron-

chial tubes are found to be filled with worms, often in incredible numbers. In this disease turpentine has peculiar claims upon our notice, as its use has been in many instances attended with the best results. It acts evidently through the medium of the circulation, being directly absorbed into the system; as it impregnates even the breath, we may easily conceive its effect upon the parasites.

Calves are subject to inflammation of the lungs; the treatment, modified according to the age and strength of the calf, will be the same as that already described in adult beasts. Calves of six months old require only a fourth of the dose of medicine ordinarily given to cattle; and one-half is sufficient for calves of twelve months old.

A disease, termed navel-ill, is apt to appear in young calves between the third and tenth day after birth. Perhaps a little oozing of blood from the umbilical cord at first took place, which was stopped by the application of caustic, or by a ligature too near the abdomen, and the result is inflammation. Sometimes, however, this inflammation comes on without any known cause; the part swells, and perhaps suppurates; in the latter case, as soon as the abscess points, it must be opened by a lancet. Fomentations, poultices, and medicine, consisting of a few two-ounce doses of castor-oil made into an emulsion with the yolk of an egg, constitute the course of treatment. If, however, great debility, as is often the case, should succeed, stimulants may be given, as a little ale in gruel, or a little port wine with powdered gentian (half a drachm).

When about a year old calves are very subject to inflammatory complaints. These may be prevented by a little medicine, and keeping them on a scanty pasture. Quick forcing at this period by luxurious diet is one of the great sources of destruction among young cattle; it is by degrees only that they should be brought to a rich grazing ground, or to dry and stimulating food.

With regard to the weaning of calves, different practices prevail in different counties; it may, however, be laid down as a rule that, when calves, male or female, are designed for rearing, they should not be weaned before six weeks or two months old; milk is their natural food, and it is incontestable that the longer a calf sucks, the stronger the animal grows up, the better its form and contour, and the more healthy and sound its constitution. If the mother does not yield a suffi-

ciency of milk, let the calf be also fed from the pail, due care being taken that its stomach be not overloaded. No calf should be weaned suddenly: the change of diet must be effected by degrees, a little good sweet hay or grass being allowed. To this at last the calf will take almost exclusively: a little skimmed milk, buttermilk, or a mash may be now occasionally given; some feed the calf when weaned three times a day, but it is better to give the food oftener, though in less quantity at a time. It should, however, be sufficient, and of good quality, otherwise the animal will be stunted in growth. It is an excellent plan to allow it to feed in the field or paddock with its mother a few hours every day; the fresh air and the exercise strengthen its limbs and give tone to the digestive organs, and its contour becomes better developed. Hence it is that calves kept constantly in a stable or cow-house, seldom thrive so well in the long run as those which are allowed exercise. In choosing calves for rearing, those born in the spring are to be preferred; before the severities of winter come on they will have acquired strength to bear the cold, which is trying to younger and feebler animals, and against which they should be carefully guarded. No calves should be reared but those which are perfect in form, with broad hips in the female, a capacious chest, and sound lungs. Some recommend that calves intended for rearing should be allowed to suck the mother for three or four days, but no more, and then brought up by hand at the pail. But, as we have said, the longer a calf sucks, the finer animal in all respects does it grow up, and the more it will ultimately sell for, so that the profit will pay for the milk consumed.

To a small farmer, who depends on his milk and its produce, we doubt the advantage of rearing calves, excepting on the meagre plan above described.

Calves intended for the butcher may be weaned earlier than others; in dairy districts they are generally sold as soon as possible, for it is chiefly in the neighbourhood of large towns that the practice of fattening calves for the market is profitable. The calf-dealer, therefore, buys up the calves in the dairy districts, and sells them again to those who rear them. The poor animals are often carried to a great distance in carts, packed together on their sides, with their four feet tied firmly together, and their heads hanging over the back and sides of the cart. This is a most cruel and barbarous practice, and ought to be abolished by the Legislature. It is dis-

tressing to behold the poor animals, bound in this uneasy position, in which they often remain whole days without food or drink, so that when they arrive at the place of sale they are so weak and attenuated, that many of them die; and all of them require the greatest care and attention before they recover sufficient strength to bear their natural food. If allowed to satisfy their appetite at first, excessive diarrhœa supervenes, and they frequently die. In these cases active astringents are utterly useless—they only accelerate the fatal termination. The exhausted calves must be fed upon boiled milk, given by little and little at a time. To the milk thus prepared, arrow-root or fine flour may be added, and occasionally an egg well beaten up previously. Gradually the tone of the stomach will be restored, and the animals begin to thrive.

A writer on the treatment of calves for the butcher, makes the following observations :—

"When the calf begins to thrive on the milk which he sucks, or which is given him warm from the cow, nothing more is necessary than to keep him extremely clean and dry, to give him plenty of air, but not much light, and never to disturb him between his meals, which are generally twice in the day, at the usual time of milking the cows. When it can be conveniently done, it is better to let them suck three times a day. If one cow does not give sufficient milk to satisfy the calf when he begins to get large, another cow must be at hand. Where a number of calves are fattened at once, and no butter or cheese is made, the number and age of the calves must be regulated by the number of cows and the quantity of milk which they give, so that there shall be milk enough for all.

"The calf pens should be made like narrow stalls, each for the accommodation of only one calf, just wide enough to allow him to lie down, but not to turn about and lick himself, which, if it become a habit, will much retard his progress in fattening. The bottom of the pen should be paved with brick, and washed clean morning and evening—or it should be boarded; the boards should be six inches from the ground, and have holes bored in them to let the urine drain through. A piece of chalk or powdered limestone is frequently put in a small trough, which the calf licks, and thus corrects the acidity which is apt to be generated in the stomach.

When the calves are taken out of their stalls to suck the cows, they must not be allowed to play instead of sucking. If

they appear not to have much appetite, a little salt may be rubbed into their mouth, and they may occasionally have a raw egg put down their throat. At five or six weeks old, if a little sweet hay is tied in a small bundle with a string, and hung before them, they will pick a little of it; and by thus exciting the saliva the digestion will be assisted. It is only by minute attention that the suckling of calves can be made more profitable than the making of butter or cheese. When it is well managed, and the price of veal is about one-half the price of butter by the pound, there is an advantage in suckling, but otherwise making butter is more profitable.

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